4. Bensaleh H, Perney P, Dereure O, Guilhou JJ, Guillot B. Merkel cell carcinoma in a liver transplant recipient. Am J Clin Dermatol. 2007;8:239–41. DOI: 10.2165/00128071-200708040-00006
5. Miller RW, Rabkin CS. Merkel cell carcinoma and melanoma: etiological similarities and differences. Cancer Epidemiol Biomarkers Prev. 1999;8:153–8.
6. Engels EA, Frisch M, Goedert JJ, Biggar RJ, Miller RW. Merkel cell carcinoma and HIV infection. Lancet. 2002;359:497–8. DOI: 10.1016/S0140-6736(02)07668-7
7. Feng H, Shuda M, Chang Y, Moore PS. Clonal integration of a polyomavirus in human Merkel cell carcinoma. Science. 2008;319:1096–100. DOI: 10.1126/science.1152586
8. Das BC, Sharma JK, Gopalakrishna V, Luthra UK. Analysis by polymerase chain reaction of the physical state of human papillomavirus type 16 DNA in cervical preneoplastic and neoplastic lesions. J Gen Virol. 1992;73:2327–36. DOI: 10.1099/0022-1317-73-9-2327

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## Worldwide Prevalence of Head Lice

**To the Editor:** Pediculosis capitis has been well-known since antiquity (*1*). Human infestation can result in psychological frustration for parents and children (*2*); furthermore, preventive and therapeutic practices, such as head shaving and the "no-nit" policy of excluding infected children from school, can also induce social stress.

We sought to synthesize the available evidence regarding the worldwide prevalence of lice infestation in the 21st century by conducting a literature search of PubMed and Scopus databases in which we searched for the term *pediculosis*. We also searched Google for the terms *head lice/pediculosis capitis* and individual country names and evaluated references of the articles and reports retrieved through this search. Eligible studies were archived from January 1, 2000, to January 18, 2008.

We retrieved 55 studies (online Technical Appendix, available from www.cdc.gov/EID/content/14/9/1493-Techapp.pdf). Most studies referred to schoolchildren, but some involved refugees, urban slums, child labor, jails, orphanages, and fishing communities.

Most studies had been conducted in Asia; Turkey was overrepresented. Prevalence varied from 0.7% to 59% and was higher in girls and women. Of the 29 studies, 24 involved schoolchildren; the other studies involved refugee children, child laborers, the general population, street children, jail inmates, and children accompanying their mothers in prison.

In Europe, prevalence varied from 0.48% to 22.4%. However, 1 study reported a much higher annual incidence (37.4%) in England (*3*). A study in the Ukraine showed increasing adult representation in the overall affected population (*4*). Six studies involved schoolchildren; the remaining studies involved refugees, homeless persons, and the general population.

Data from Africa, with the exception of 1 study in South Africa, were derived from Egypt. Prevalence varied from 0% to 58.9% and was higher in females. The study in South Africa (*5*) challenges the generally accepted concept that head lice infestation refers to lower socioeconomic status; of 2 schools, 1 in a low socioeconomic status area, populated by black students only, and the other in a high socioeconomic status area, populated by students of various races, head lice infestation was found only in the second school, solely among white pupils. Of 6 studies in Egypt, 4 involved diverse populations: urban poor preschool children, orphanage children, and the general population.

Most studies in the Americas were conducted in Brazil, although we also found data from the United States, Cuba, and Argentina. Prevalence varied from 3.6% to 61.4% and was higher in females. Of 7 studies, 4 involved populations other than schoolchildren to some extent: urban slum residents, fishing community residents, adolescents and adults sampled randomly from the general population, elderly nursing home residents, and persons living with repeatedly infested children. A recent study in Brazil (*6*) noted that prevalence rates determined by visual inspection are twice that of rates determined by hair analysis.

Only 1 study has been performed in Oceania. This study in Australia reported prevalence of 13% and that girls were more likely to have active infection.

Our review shows that pediculosis capitis is widespread throughout the world and does not discriminate on socioeconomic status grounds. The traditional perception of head lice as a parasitosis exclusively associated with schoolchildren of low socioeconomic status is challenged by some of the reports (online Technical Appendix).

Most studies underestimate overall prevalence by assessing it in a specific timeframe; to the contrary, head lice infestation is a dynamic process that can spread hypergeometrically in closed environments such as schools and in the community (*7*). The point-prevalence reported by Heukelbach et al (*8*) may represent a more accurate indicator.

Although socioeconomic status seems to be an indicator of the magnitude of lice infestation, more specific determinants are the dynamic processes of hygienic status and overcrowding. A recent study in Turkey compared 2 neighboring villages with different socioeconomic status. The only factor that was statistically significantly related to pediculosis capitis was size of the household; ≥6 inhabitants was associated with increased prevalence (*9*).

Another parameter that may indirectly influence overall prevalence and account for the leveling of the prevalence gradient between rich and poor is awareness of head lice and preventive and therapeutic practices. A study in Australia showed that although parents prefer to play a major role in prevention and treatment, they may lack insight into recent advances and dilemmas regarding these measures (*10*).

Variations in reported prevalence were found even in data from the same country. These differences can result from surveys being conducted during different seasons, various examination techniques, reporting of active infestation or presence of nits, and potential introduction of effective pediculicides.

Although head lice account for a substantial number of missed schooldays in children, among others, it is surprising that pediculosis capitis is not monitored and prevalence is not regularly reported. Although we cannot extinguish the parasite, effective monitoring and planning will enable us to limit the prevalence and distribution of this parasitosis.

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### References

1. Fournier PE, Ndihokubwayo JB, Guidran J, Kelly PJ, Raoult D. Human pathogens in body and head lice. Emerg Infect Dis. 2002;8:1515–8.
2. Mumcuoglu KY, Meinking TA, Burkhart CN, Burkhart CG. Head louse infestations: the "no nit" policy and its consequences. Int J Dermatol. 2006;45:891–6. DOI: 10.1111/j.1365-4632.2006.02827.x
3. Harris J, Crawshaw JG, Millership S. Incidence and prevalence of head lice in a district health authority area. Commun Dis Public Health. 2003;6:246–9.
4. Kurhanova I. Lice infestation and lice control remedies in the Ukraine. Ann N Y Acad Sci. 2006;1078:357–60. DOI: 10.1196/annals.1374.070
5. Govere JM, Speare R, Durrheim DN. The prevalence of pediculosis in rural South African schoolchildren. S Afr J Sci. 2003;99:21–3 [cited 2008 Jul 17]. Available from http://www.jcu.edu.au/school/phtm/PHTM/hlice/papers/govere-2003.pdf
6. Borges R, Silva JJ, Rodrigues RM, Mendes J. Prevalence and monthly distribution of head lice using two diagnostic procedures in several age groups in Uberlandia, State of Minas Gerais, Southeastern Brazil. Rev Soc Bras Med Trop. 2007;40:247–9.
7. Stone P, Wilkinson-Herbots H, Isham V. A stochastic model for head lice infections. J Math Biol. 2008;56:743–63. DOI: 10.1007/s00285-007-0136-0
8. Heukelbach J. van HE, Rump B, Wilcke T, Moura RC, Feldmeier H. Parasitic skin diseases: health care-seeking in a slum in north-east Brazil. Trop Med Int Health. 2003;8:368–73. DOI: 10.1046/j.1365-3156.2003.01038.x
9. Balcioglu IC, Kurt O, Limoncu ME, Dinç G, Gümüş M, Kilimcioglu AA, et al. Rural life, lower socioeconomic status and parasitic infections. Parasitol Int. 2007;56:129–33. DOI: 10.1016/j.parint.2007.01.005
10. Counahan ML, Andrews RM, Weld H, Helen W, Speare R. What parents in Australia know and do about head lice. Rural Remote Health. 2007;7:687.

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## Texas Isolates Closely Related to *Bacillus anthracis* Ames

**To the Editor:** Forensic and epidemiologic investigation of the 2001 bioterrorism-associated anthrax attacks used multiple-locus variable-number tandem-repeat analysis (MLVA) to identify the attack strain as Ames (*1*). Strain identity was essential for subsequent molecular epidemiologic and forensic investigations of this biocrime. To more easily identify this particular strain, comparative whole-genome sequencing (*2*) and phylogenetic analyses were used to identify single-nucleotide polymorphisms (SNPs) that seem highly specific for Ames strain identification (*3*). Because *Bacillus anthracis* is a recently emerged clonal pathogen, these SNPs represent highly evolutionarily stable markers (*4*) that are amenable to many rapid and cost-effective analytical techniques.

MLVA and the Ames-specific SNP assay indicate that the Ames strain has been isolated from nature only 1 time, in southern Texas, USA. Several lineages of *B. anthracis* (*5*) have been ecologically established in North America. The A.Br.009 clade is the most successful and widely dispersed in North America, but it is not closely related to the Ames

# Worldwide Prevalence of Head Lice

## Technical Appendix

Table. Worldwide prevalence of head lice infestation*

| Country (reference) | Year | Setting | Definition | Incidence |
|---|---|---|---|---|
| Asia | | | | |
| China (*1*) | 2004 | Refugee children | NA | 43/303 (14.2%) |
| India (*2*) | 2004 | Child laborers in a slum area | NA | 72/150 (48%) |
| India (*3*) | 2002 | Public primary-school children | NA | 156/940 (16.59% overall; 20.42% girls, 13.86% boys) |
| India (*4*) | 2002 | Jail inmates | NA | 15/225 (6.6%) |
| Iran (*5*) | 2006 | Children in 12 public rural primary schools | Detection of nits and/or lice | 58/847 (6.85%) (55/407 [13.%] girls, 3/440 [0.7%] boys) |
| Iran (*6*) | 2005 | Primary-school children | NA | 45/1,200 (3.8%); 2/564 boys, 45/636 girls |
| Iraq (*7*) | 2003 | 409 children from 2 primary schools in Baghdad with different school environment and hygienic status | NA | 48.9% incidence in the school with lower school environment and hygiene status. 9.4% in other school |
| Israel (*8*) | 2001 | Children 7–10 years of age | Visual examination and combing; detection of nits and/or lice | 152/268; (56.7% overall; 61.2% girls, 36.7% boys) |
| Jordan (*9*) | 2000 | Elementary public-school children | Detection of nits and/or lice | 338/2,519 (13.4% overall; 14.5% girls, 11.1% boys) |
| South Korea (*10*) | 2003 | Kindergarten and primary-school children | NA | 435/7,495 (5.8% overall; 11.2% girls, 0.9% boys) |
| South Korea (*11*) | 2000 | Kindergarten and primary-school children | Detection of nits and/or lice | 294/2,288 (12.8% overall; 23.5% girls, 3.9% i boys) |
| Malaysia (*12*) | 2006 | 11-year-old schoolchildren | Fine-tooth combing and visual examination; detection of nits and/or lice | 162/463 (35%) |
| Nepal (*13*) | 2004 | A sample of persons 10–39 years of age, street children | NA | 16%<br>59% |
| Nepal (*14*) | 2004 | Urban schoolchildren | NA | 172/ 818 (21%) |
| Palestine (*15*) | 2006 | Primary-school girls, 6–14 years of age, from rural and urban area | Detection of nits or lice | 340/2,408 (14.1%) with lice<br>843 of 2408 (35%) with nits |
| Saudi Arabia (*16*) | 2006 | Urban female schoolchildren from private and preparatory schools | NA | 116/2239 (5.2%) |
| Sri Lanka (*17*) | 2001 | Children accompanying their mothers in prison | NA | 10% |
| Taiwan (*18*) | 2001 | Students | NA | 615/5121 (12%) |
| Taiwan (*19*) | 2000 | Primary-school children (12.9%) from 4 rural districts and 1 urban area | NA | 391/3029; More common in rural areas and among girls |
| Turkey (*20*) | 2007 | Schoolchildren | Visual inspection | 31.1% in a low socioeconomic–status village, 7.7% in a neighboring higher socioeconomic status village (69 and 31 children, respectively) |
| Turkey (*21*) | 2007 | Deaf students | NA | 6/117 (5.1%) |
| Turkey (*22*) | 2006 | Schoolchildren | Visual inspection | 9/1134 (0.8%) |
| Turkey (*23*) | 2006 | Primary-school children | NA | 20/68 (29.4%); 0/32 (0%) boys, 20/36 (55.5%) girls |

| Country (reference) | Year | Setting | Definition | Incidence |
|---|---|---|---|---|
| Turkey (*24*) | 2006 | Primary-school children | Detection of nits and/or lice | 117/1261 (9.1%); 16/648 (2.1%) boys, 101/613 (16.4%) girls |
| Turkey (*25*) | 2006 | Rural primary-school children | Nits (no adult lice detected) | 17/178 (9.5%); 2/104 (1.9%) boys, 15/74 (20.3%) girls |
| Turkey (*26*) | 2005 | Schoolchildren 7–14 years of age | Visual examination; detection of nits and/or lice | 260/1569 (16.6% overall; 31.8% girls, 2.5% boys) |
| Turkey (*27*) | 2003 | Elementary-school children | Detection of nits and/or lice | 360/5318 (6.8% overall; 13.3% girls, 1.1% boys) |
| Turkey (*28*) | 2003 | Schoolchildren | NA | 701/20612 (3.4%) |
| Turkey (*29*) | 2002 | Primary-school children | NA | 74/785 (9.4%) |
| Europe | | | | |
| Albania (*30*) | 2002 | Refugees from Kosovo (479,223 officially registered) | NA | ≈4% |
| Belgium (*31*) | 2005 | Schoolchildren 2.5–12 years of age | Wet combing | 549/6169 (8.9%) |
| Belgium (*32*) | 2000 | Primary-school children in a socially deprived urban area | Visual examination and combing | 49/224 (21.9%) |
| Czech Republic (*33*) | 2006 | Schoolchildren 6–15 years of age | Dry-hair combing; detection of live lice or dead nits. | 75/531 with lice (14.1%)<br>52/531 with nits (9.8%) |
| England (*34*) | 2003 | Primary-school children | NA | 438/21556 (2.03%); annual incidence 37.4% |
| England (*35*) | 2003 | Diagnosis of pediculosis in the West Midland population from 1993-2000 | NA | 28.2/1,000 patient years at risk |
| France (*36*) | 2007 | Urban primary-school children | Fine-tooth combing. Detection of live lice | 112/3345 (3.3%) |
| France (*37*) | 2005 | Homeless persons | NA | 205/930 (22%) |
| Kosovo (*38*) | 2000 | Kosovar refugees upon arrival in the United States | Detection of nits and/or lice | 107/1051 (10.2%) |
| Poland (*39*) | 2004 | Rural schoolchildren, urban schoolchildren | NA | 682/42759 (1.59%)<br>252/52394 (0.48%) |
| Ukraine (*40*) | 2006 | Population of Ukraine 1990–2004 | NA | Referenced as endemic, no actual data shown. Predominance of children in the total infected population in 1990 roughly equal infestation of adults and children in 2004 |
| Africa | | | | |
| Egypt (*41*) | 2003 | Rural inhabitants of all ages | NA | 1551/8008 (19.37%) |
| Egypt (*42*) | 2002 | Population sample | Visual examination | 137/2448 (5.6%) |
| Egypt (*43*) | 2001 | Primary-, preparatory-, secondary- school children | NA | 384/1772 with head or body lice (21.67% overall; 30.26% girls, 17.7% boys, 18.2:1 head lice:body lice ratio) |
| Egypt (*44*) | 2000 | Urban poor preschool children | Visual examination | 151/ 256 (58.9%) |
| Egypt (*45*) | 2000 | Orphanage children 2–6 years of age | NA | 64.1% |
| Egypt (*46*) | 2000 | Primary-school children | NA | 276/510 (54.1%) |
| South Africa (*47*) | 2003 | Primary-school children 6–13 years of age (black and white) from 2 rural schools, 1 with low and 1 with high socioeconomic status | Visual examination followed by hair conditioner and fine-tooth combing if evidence of lice found; detection of nits and/or lice | 0/300 (0%) in the school with low socioeconomic status; 15/175 (8.6%) in the other school; all infected children were white |
| Americas | | | | |
| Argentina (*48*) | 2005 | Primary-school children from public and private school | Detection of nits and/or lice | 842/1370 (61.4%); 296/678 (44%) boys, 546/692 (79%) girls |

| Country (reference) | Year | Setting | Definition | Incidence |
|---|---|---|---|---|
| Brazil (*49*) | 2007 | 98 children, 196 adolescents, 119 adults, 90 elderly nursing home residents | Cut hair analysis and visual inspection | 13.3%, 5.6%, 5.4%. and 5.5% respectively, by cut hair analysis. Visual inspection doubled this prevalence in general |
| Brazil (*50*) | 2005 | Urban slum residents, fishing community residents | NA | 634/1460 (43.4%); 170/605 (28.1%) |
| Brazil (*51*) | 2003 | Slum population attending a primary healthcare center | NA | Point prevalence 38.2% |
| Brazil (*52*) | 2002 | Children 0–15 years of age at day care centers; public, urban, rural schools | NA | 309/884 (35%) |
| Cuba (*53*) | 2000 | Persons living with children who repeatedly had pediculosis | NA | 40/237 (14.54% overall; 82.5% female) |
| United States (*54*) | 2001 | Students | Detection of nits or lice | 28/1729 (1.6%) with lice<br>63/1729 (3.6%) with nits without lice |
| Oceana (Australia) (*55*) | 2004 | Primary-school children | Hair conditioner and fine-tooth combing; detection of nits and/or lice | 239/1838 (13%); girls more likely to have active infection |

*NA, not available.

## References


1. Fan CK, Liao CW, Wu MS, Hu NY, Su KE. Prevalence of *Pediculus capitis* infestation among school children of Chinese refugees residing in mountanous areas of northern Thailand. Kaohsiung J Med Sci. 2004;20:183–7. PubMed

2. Mallik S, Chaudhuri RN, Biswas R, Biswas B. A study on morbidity pattern of child labourers engaged in different occupations in a slum area of Calcutta. J Indian Med Assoc. 2004;102:198–200, 226. PubMed

3. Khokhar A. A study of pediculosis capitis among primary school children in Delhi. Indian J Med Sci. 2002;56:449–52. PubMed

4. Kuruvila M, Shaikh MI, Kumar P. Pattern of dermatoses among inmates of district prison—Mangalore. Indian J Dermatol Venereol Leprol. 2002;68:16–8. PubMed

5. Nazari M, Fakoorziba MR, Shobeiri F. *Pediculus capitis* infestation according to sex and social factors in Hamedan, Iran. Southeast Asian J Trop Med Public Health. 2006;37(Suppl 3):95–8. PubMed

6. Kamiabi F, Nakhaei FH. Prevalence of pediculosis capitis and determination of risk factors in primary-school children in Kerman. East Mediterr Health J. 2005;11:988–92. PubMed

7. Al-Kubiassy W, Abdul Karim ET. Head lice in pupils of two primary schools in Baghdad. J Bahrain Med Soc. 2003;15:34–8.

8. Mumcuoglu KY, Friger M, Ioffe-Uspensky I, Ben-Ishai F, Miller J. Louse comb versus direct visual examination for the diagnosis of head louse infestations. Pediatr Dermatol. 2001;18:9–12. PubMed DOI: 10.1046/j.1525-1470.2001.018001009.x

9. Amr ZS, Nusier MN. Pediculosis capitis in northern Jordan. Int J Dermatol. 2000;39:919–21. PubMed DOI: 10.1046/j.1365-4362.2000.00088.x

10. Sim S, Lee IY, Lee KJ, et al. A survey on head lice infestation in Korea (2001) and the therapeutic efficacy of oral trimethoprim/sulfamethoxazole adding to lindane shampoo. Korean J Parasitol. 2003;41:57–61. PubMed

11. Ha YC, Heo JM, Kim HJ, et al. Infestation status of head louse and treatment with lindane shampoo in children of primary school and kindergarten in Chinju-shi, Kyongsangnam-do, Korea. Korean J Parasitol. 2000;38:41–3. PubMed

12. Bachok N, Nordin RB, Awang CW, Ibrahim NA, Naing L. Prevalence and associated factors of head lice infestation among primary schoolchildren in Kelantan, Malaysia. Southeast Asian J Trop Med Public Health. 2006;37:536–43. PubMed

13. Poudel SK, Barker SC. Infestation of people with lice in Kathmandu and Pokhara, Nepal. Med Vet Entomol. 2004;18:212–3. PubMed DOI: 10.1111/j.0269-283X.2004.00494.x

14. Shakya SR, Bhandary S, Pokharel PK. Nutritional status and morbidity pattern among governmental primary schoolchildren in the Eastern Nepal. Kathmandu Univ Med J. 2004;2:307–14.

15. Al-Shawa RM. Head louse infestations in Gaza governorates. J Med Entomol. 2006;43:505–7. PubMed DOI: 10.1603/0022-2585(2006)43[505:HLIIGG]2.0.CO;2

16. Al-Saeed WY, Al-Dawood KM, Bukhari IA, Bahnassy AA. Prevalence and pattern of skin disorders among female schoolchildren in Eastern Saudi Arabia. Saudi Med J. 2006;27:227–34. PubMed

17. Senanayake MP, Arachchi JK, Wickremasinghe VP. Children of imprisoned mothers. Ceylon Med J. 2001;46:51–3. PubMed

18. Fan PC, Chung WC, Chen ER. Parasitic infections among the aborigines in Taiwan with special emphasis on Taeniasis asiatica. Kaohsiung J Med Sci. 2001;17:1–15. PubMed

19. Wu YH, Su HY, Hsieh YJ. Survey of infectious skin diseases and skin infestations among primary school students of Taitung County, eastern Taiwan. J Formos Med Assoc. 2000;99:128–34. PubMed

20. Balcioglu IC, Kurt O, Limoncu ME, et al. Rural life, lower socioeconomic status and parasitic infections. Parasitol Int. 2007;56:129–33. PubMed DOI: 10.1016/j.parint.2007.01.005

21. Atambay M, Karaman O, Karaman U, Aycan O, Yologlu S, Daldal N. The frequency of intestinal parasites and head lice among students of the Aksemsettin Primary School for Deaf Students. Turkiye Parazitol Derg. 2007;31:62–5. PubMed

22. Ciftci IH, Karaca S, Dogru O, Cetinkaya Z, Kulac M. Prevalence of pediculosis and scabies in preschool nursery children of Afyon, Turkey. Korean J Parasitol. 2006;44:95–8. PubMed

23. Noyan E, Demir V. Investigation of pediculosis carried out as the special study module No. 74, a part of Ege University Medical Faculty's educational program. Turkiye Parazitol Derg. 2006;30:32–4. PubMed

24. Oguzkaya Artan M, Baykan Z, Koc AN. The prevalence of *Pediculus capitis* in students of eight primary schools in the rural area of the Kayseri province. Turkiye Parazitol Derg. 2006;30:112–4. PubMed

25. Ozcelik S, Degerli S, Aslan A. Investigation of the prevalence of *Pediculus* in Alahaci village primary school students in the Sivas province. Turkiye Parazitol Derg. 2006;30:184–6. PubMed

26. Akisu C, Aksoy U, Delibas SB, Ozkoc S, Sahin S. The prevalence of head lice infestation in school children in Izmir, Turkey. Pediatr Dermatol. 2005;22:372–3. PubMed DOI: 10.1111/j.1525-1470.2005.22423.x

27. Kokturk A, Baz K, Bugdayci R, et al. The prevalence of pediculosis capitis in schoolchildren in Mersin, Turkey. Int J Dermatol. 2003;42:694–8. PubMed DOI: 10.1046/j.1365-4362.2003.01836.x

28. Tanyuksel M, Araz RE, Albay A, Aycicek H. Prevalence and treatment of *Pediculus humanus capitis* with 1% permethrin and 0.4% d-phenothrin in Turkey. Acta Medica (Hradec Kralove). 2003;46:73–5. PubMed

29. Inanir I, Sahin MT, Gunduz K, Dinc G, Turel A, Ozturkcan S. Prevalence of skin conditions in primary school children in Turkey: differences based on socioeconomic factors. Pediatr Dermatol. 2002;19:307–11. PubMed DOI: 10.1046/j.1525-1470.2002.00087.x

30. Kondaj R. Management of refugee crisis in Albania during the 1999 Kosovo conflict. Croat Med J. 2002;43:190–4. PubMed

31. Willems S, Lapeere H, Haedens N, Pasteels I, Naeyaert JM, De MJ. The importance of socio-economic status and individual characteristics on the prevalence of head lice in schoolchildren. Eur J Dermatol. 2005;15:387–92. PubMed

32. De Maeseneer J, Blokland I, Willems S, Vander SR, Meersschaut F. Wet combing versus traditional scalp inspection to detect head lice in schoolchildren: observational study. BMJ. 2000;321:1187–8. PubMed DOI: 10.1136/bmj.321.7270.1187

33. Rupes V, Vlckova J, Mazanek L, Chmela J, Ledvinka J. Pediatric head lice: taxonomy, incidence, resistance, delousing. Epidemiol Mikrobiol Imunol. 2006;55:112–9. PubMed

34. Harris J, Crawshaw JG, Millership S. Incidence and prevalence of head lice in a district health authority area. Commun Dis Public Health. 2003;6:246–9. PubMed

35. Smith S, Smith G, Heatlie H, Bashford J, Ashcroft D, Millson D. Head lice diagnosed in general practice in the West Midlands between 1993 and 2000: a survey using the General Practice Research Database. Commun Dis Public Health. 2003;6:139–43. PubMed

36. Durand R, Millard B, Bouges-Michel C, Bruel C, Bouvresse S, Izri A. Detection of pyrethroid resistance gene in head lice in schoolchildren from Bobigny, France. J Med Entomol. 2007;44:796–8. PubMed DOI: 10.1603/0022-2585(2007)44[796:DOPRGI]2.0.CO;2

37. Brouqui P, Stein A, Dupont HT, et al. Ectoparasitism and vector-borne diseases in 930 homeless people from Marseilles. Medicine (Baltimore). 2005;84:61–8. PubMed DOI: 10.1097/01.md.0000152373.07500.6e

38. Manjrekar RR, Partridge SK, Korman AK, Barwick RS, Juranek DD. Efficacy of 1% permethrin for the treatment of head louse infestations among Kosovar refugees. Mil Med. 2000;165:698–700. PubMed

39. Buczek A, Markowska-Gosik D, Widomska D, Kawa IM. Pediculosis capitis among schoolchildren in urban and rural areas of eastern Poland. Eur J Epidemiol. 2004;19:491–5. PubMed DOI: 10.1023/B:EJEP.0000027347.76908.61

40. Kurhanova I. Lice infestation and lice control remedies in the Ukraine. Ann N Y Acad Sci. 2006;1078:357–60. PubMed DOI: 10.1196/annals.1374.070

41. Abdel-Hafez K, Abdel-Aty MA, Hofny ER. Prevalence of skin diseases in rural areas of Assiut Governorate, Upper Egypt. Int J Dermatol. 2003;42:887–92. PubMed DOI: 10.1046/j.1365-4362.2003.01936.x

42. El-Basheir ZM, Fouad MA. A preliminary pilot survey on head lice, pediculosis in Sharkia Governorate and treatment of lice with natural plant extracts. J Egypt Soc Parasitol. 2002;32:725–36. PubMed

43. Morsy TA, el-Ela RG, Mawla MY, Khalaf SA. The prevalence of lice infesting students of primary, preparatory and secondary schools in Cairo, Egypt. J Egypt Soc Parasitol. 2001;31:43–50. PubMed

44. El Sahn AA, Hassan MH, Ftohy EM, Abou-El Ela NE, Eassa SM. Parasitic infections and maternal awareness of preschool children in Karmouz district, Alexandria. J Egypt Public Health Assoc. 2000;75:1–29. PubMed

45. Morsy TA, el-Ela RG, Morsy AT, Nassar MM, Khalaf SA. Two contagious ectoparasites in orphanage children in Nasr City, Cairo. J Egypt Soc Parasitol. 2000;30:727–34. PubMed

46. Omar AA. Ringworm of the scalp in primary-school children in Alexandria: infection and carriage. East Mediterr Health J. 2000;6:961–7. PubMed

47. Govere JM, Speare R, Durrheim DN. The prevalence of pediculosis in rural South African schoolchildren [cited 2008 Jul 17]. S Afr J Sci. 2003;99:21. Available from http://www.jcu.edu.au/school/phtm/PHTM/hlice/papers/govere-2003.pdf

48. Catala S, Junco L, Vaporaky R. *Pediculus capitis* infestation according to sex and social factors in Argentina. Rev Saude Publica. 2005;39:438–43. PubMed DOI: 10.1590/S0034-89102005000300015

49. Borges R, Silva JJ, Rodrigues RM, Mendes J. Prevalence and monthly distribution of head lice using two diagnostic procedures in several age groups in Uberlandia, State of Minas Gerais, Southeastern Brazil. Rev Soc Bras Med Trop. 2007;40:247–9. PubMed

50. Heukelbach J, Wilcke T, Winter B, Feldmeier H. Epidemiology and morbidity of scabies and pediculosis capitis in resource-poor communities in Brazil. Br J Dermatol. 2005;153:150–6. PubMed DOI: 10.1111/j.1365-2133.2005.06591.x

51. Heukelbach J, van HE, Rump B, Wilcke T, Moura RC, Feldmeier H. Parasitic skin diseases: health care-seeking in a slum in north-east Brazil. Trop Med Int Health. 2003;8:368–73. PubMed DOI: 10.1046/j.1365-3156.2003.01038.x

52. Borges R, Mendes J. Epidemiological aspects of head lice in children attending day care centres, urban and rural schools in Uberlandia, central Brazil. Mem Inst Oswaldo Cruz. 2002;97:189–92. PubMed DOI: 10.1590/S0074-02762002000200007

53. Castex M, Suarez S, de la Cruz AM. Presence of pediculosis in people living with children positive to *Pediculus capitis* (Anoplura: Pediculidae). Rev Cubana Med Trop. 2000;52:225–7. PubMed

54. Williams LK, Reichert A, MacKenzie WR, Hightower AW, Blake PA. Lice, nits, and school policy. Pediatrics. 2001;107:1011–5. PubMed DOI: 10.1542/peds.107.5.1011

55. Counahan M, Andrews R, Buttner P, Byrnes G, Speare R. Head lice prevalence in primary schools in Victoria, Australia. J Paediatr Child Health. 2004;40:616–9. PubMed DOI: 10.1111/j.1440-1754.2004.00486.x