A Systematic Review of Epidemiologic Studies on Scabies in the Philippines

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ABSTRACT

Background and Objective. Scabies is the second most common cause of disability due to skin disease in the Philippines. However, there were no cited studies in Global Burden of Disease 2019 and the disability-adjusted life years (DALY) computations were most likely based on statistical modelling. The Philippine Department of Health has embarked on a program to estimate the disease burden of priority diseases in the country, which include scabies. The last nationwide prevalence survey was 23 years ago. This systematic review aimed to estimate the prevalence or incidence of scabies in the Philippines.

Methods. We searched PubMed, Scopus, Herdin, and Philippine Health Research Registry (search date October 2022) for studies on prevalence/incidence (including systematic reviews, cross-sectional studies, cohort studies, case series, registry or census studies) of patients diagnosed with scabies in the Philippines. We excluded narrative reviews, commentaries, and conference proceedings or abstracts. Two reviewers independently screened titles and abstracts, assessed full text reports for eligibility, appraised the quality of included studies, and collected data using a pretested data extraction form. We did not pool studies due to clinical heterogeneity but plotted the individual studies in a forest plot with prevalence estimates and confidence intervals. We reported the median and interquartile range for entire group or relevant subgroups (age, setting) of studies. We used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to assess the certainty of evidence.

Results. We included nine studies (N=79,065). Most were clinic-based prevalence studies, retrospective chart reviews, conducted in dermatology outpatient clinics, Metro Manila area, and on pediatric populations. Prevalence of scabies was moderate (i.e., between 2 and 10%), ranging from 2.75% (national prevalence survey) to 6.8% (community-based review), to high (> 10%) among pediatric patients in clinic-based retrospective chart reviews (29 to 36%) and institution-based surveys (39.0% to 45%), and a tertiary government university training hospital dermatology clinic (22.9%). The most affected age group was from 0 to 14 y/o, while males tended to have a higher prevalence than females. The cooler month of January had higher prevalence than the hotter month of June in one study.

Conclusion. Scabies is common in the Philippines, especially among children and elderly in institutional settings, and during the month of January. There is a need to do a national prevalence survey to identify high-risk areas and to monitor the prevalence of scabies, especially in crowded settings and vulnerable populations. This information can be used for estimating the burden of disease for scabies and guide appropriate health resource allocation.

Keywords: scabies, Philippines, surveillance, epidemiology, prevalence, incidence

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INTRODUCTION

Scabies is a contagious skin infestation caused by an ectoparasite, *Sarcoptes scabiei var. hominis.* In 1687, Bonomo and Cestoni were credited to be the first in the history of medicine to prove the causal relationship of scabies to disease in humans.[1] Scabies affects all age groups, but children and elderly, especially those with poor socioeconomic status, are more vulnerable. Scabies is also more common in hot and humid locations such as tropical countries and overcrowded areas (i.e., prisons, boarding houses, and camps).[2–4] In 2017, the World Health Organization (WHO) declared scabies as part of the skin neglected tropical diseases (skin NTDs) due to an estimated 3 million cases worldwide.[5] Scabies has also been included in the WHO Roadmap for Neglected Tropical Diseases 2020-2030, which aims that all 194 member countries have incorporated scabies management in the universal health coverage package of care by 2030. The goal is for 25 countries to have conducted mass drug administration (MDA) intervention in endemic areas (areas where prevalence is high, i.e., 10% or greater) by year 2030.[6] The threshold below which MDA can be stopped is at 2% (i.e., low prevalence). Between 2% and 10% prevalence, the strategy is unclear and management is dependent on local factors.

The global prevalence of scabies, based on a systematic review of population-based studies, ranged from 0.81% (Uganda) to 71% (Ghana).[7] Several countrywide systematic reviews on human scabies prevalence have shown pooled prevalence ranging from 6.2% (95% CI 3.6–10.4) in Iran[8] to 14.5% (95% CI: 1.5, 27.6) in Ethiopia.[9] In the Philippines, scabies has been cited as a prevalent skin disease in a 1918 census,[10] a World War II US army personnel report, and a 1975 WHO regional meeting.[11] We published a secondary analysis of two Philippine medical society patient registries, which showed the prevalence of scabies to be 5.15% (IQR 2.35) among patients (mostly outpatients) seen at selected dermatology departments affiliated with the Philippine Dermatological Society, and 0.05% (IQR 0.02) among inpatients admitted in Philippine Pediatric Society-affiliated hospitals.[12]

As part of the recommended framework by the WHO expert panel for scabies in 2019, prioritizing the mapping of disease burden is essential. This includes defining areas with prevalent scabies infections for possible implementation of mass drug administration. Although the GBD 2019 listed scabies as the 2nd highest disability among all skin diseases, this estimate was likely based on modelling, since there were no cited epidemiologic studies in the reference list. The last nationwide prevalence survey of skin diseases was in 2000.[13] In 2020, the Philippine Department of Health (DOH) embarked on a program to estimate the disease burden of priority diseases in the country, which included scabies.[14] Increasing cases of scabies in the Southern Philippines prompted the DOH to publish an interim guidance for the diagnosis and management of scabies in April 2023.[15]

Due to this gap in knowledge on the status of scabies in the Philippines, this study aimed to review the studies on prevalence or incidence of scabies in the Philippines to guide national policy and programs for the control of scabies.

METHODS

This systematic review was conducted from October 2022 to August 2023 and is part of the literature review for the PhD dissertation of the principal investigator with approved protocol UPM REB-2022-0055-01 by the University of the Philippines Manila-Research Ethics Board. The protocol for this systematic review may be accessed at PROSPERO database (CRD42022377341) and no amendments were applied. There was an earlier publication based on this protocol that reviewed two Philippine medical society patient registries.[12]

We included studies that reported on prevalence/incidence (systematic reviews, cross-sectional studies, cohort studies, case series, studies with clinic/registry/census data) of patients diagnosed with scabies in the Philippines, regardless of setting, age, sex, severity, type, or comorbidity. We excluded narrative reviews, commentaries, and conference proceedings or abstracts. We searched PubMed, Scopus, Herdin, and the Philippine Health Research Registry (PHRR) in October 2022. We also hand searched the reference lists of included and excluded reports, table of contents of relevant journals, and abstract books/conference proceedings. We also searched for grey literature by contacting authors and organizations in the field of neglected tropical diseases, and hand searched the theses/dissertations in the libraries of the Colleges of Pharmacy, Public Health, Nursing, and Medicine of the University of the Philippines Manila. Database search strategies used are in Appendix 1 and list of grey literature sources are in Appendix 2.

After the electronic search, we manually deduplicated the merged records using Microsoft Excel. Two reviewers independently screened titles and abstracts of unique records, and assessed the full texts of potentially relevant studies for eligibility using our prespecified inclusion and exclusion criteria. At least two independent reviewers manually extracted data and appraised the quality of included studies using a pretested data collection form using Google Docs. Disagreements were settled through discussion or a 3rd reviewer. We used the Joanna Briggs Institute (JBI) checklist for prevalence studies to appraise the quality of included studies.[16] The JBI checklist has nine criteria on sampling, response rate, population description, method of diagnosis, and statistical analysis. We assessed each criterion as 'Yes,' 'No,' Unclear', or 'Not applicable.' We counted the number of fulfilled criteria and determined number of studies with at least 50% criteria fulfilled.

We collected the following data:

- General information (author, citation, year published, inclusive dates of study)

- Participant characteristics (demographic profile, setting, diagnosis, method of diagnosis)
- Outcomes (number of patients with scabies and number of study population, prevalence, incidence).
    1. Prevalence = total number of cases with scabies divided by the total number of cases in the target population
    2. Incidence = total number of new cases per person-year (approximated by taking the number of new cases in a year divided by the midyear target population)

For any unclear information, we attempted to contact the authors.

We computed for prevalence or incidence, using percentage and corresponding 95% confidence intervals for individual studies, including age group- and sex-, and location-specific, if adequate data was provided. For studies that did not report proportions or confidence intervals, we used Stata 17 to compute for these values. The data collection form, raw data, and analytic codes are available upon request.

We summarized the results narratively by describing the median and interquartile range for the effect measures for the entire group of studies or relevant subgroups (e.g., age, sex, setting). We summarized studies according to their study characteristics (Population, location, setting) by tabulating and comparing them (Appendix 3) and planned to synthesize if any study shared those characteristics. However, we decided not to pool the data due to few studies and diverse study characteristics. We plotted the prevalence or incidence individually in a forest plot using Stata version 17. The forest plot is a graphical display of the effect estimates and confidence intervals of individual studies and is useful for visualizing the estimates even if no pooling was done. We did not perform any sensitivity analysis since no pooled synthesis was done. We assessed the certainty of evidence using the recommended approach by the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group based on risk of bias, inconsistency, indirectness, imprecision, and publication bias.[17]

RESULTS

Search Results

Out of 76 merged records from the databases, we screened titles and abstracts of 72 unique records (Figure 1). Out of 29 potentially relevant studies, seven full texts could not be retrieved (Appendix 3). Upon excluding 13 studies, we had a total of 9 included studies in the systematic review (Appendix 4). Details of each included study are in Appendix 5.

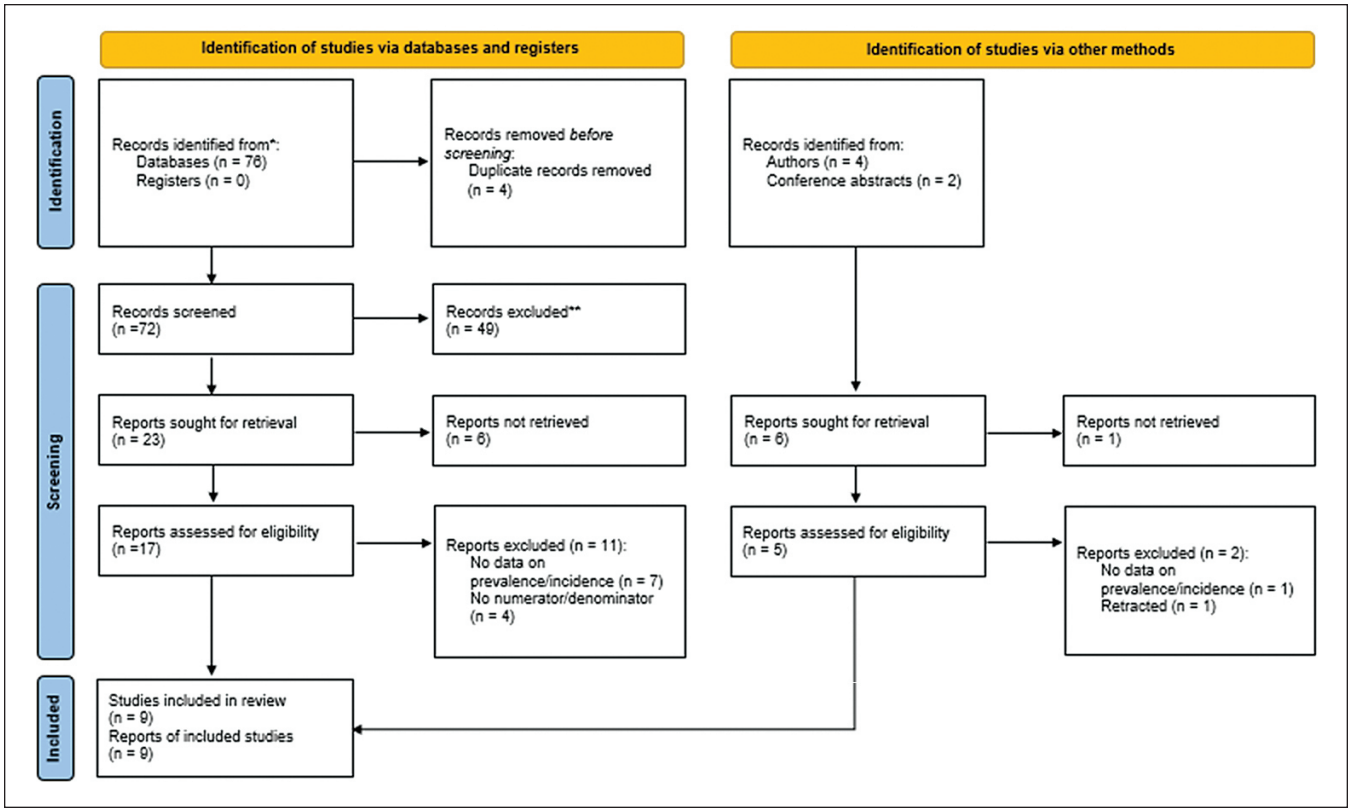

Figure 1. PRISMA flow diagram.

Characteristics of Included Studies

The nine studies were published between 1974 and 2018 and had a median sample size of 3739 participants (IQR, 19929). They were authored by Filipinos except for one study by US navy medical corps who participated in a humanitarian medical mission to three Pacific Rim countries (Philippines, Papua New Guinea, and Fiji Islands). Most studies were retrospective records reviews (k = 4);[18–21] one was a 2-part study (both retrospective record review and cross-sectional study),[22] two were cross-sectional studies,[23,24] and one was an RCT.[21] The most common region was Metro Manila (k = 4),[18,19,25,26] while one study each was conducted in Davao,[21] Zamboanga,[22] Panay Islands,[20] and nationwide (3 clusters: Metro Manila, other urban areas, rural areas).[24] The most common setting was dermatology outpatient clinics (k = 3);[18,19,21] one study had data from both dermatology outpatient clinic and inpatient admissions (dermatology service),[26] while another from both hospital general outpatient clinic and community (barrios);[22] and the rest were in an aged home,[25] orphanages,[23] community medical mission,[20] and the national population.[20] Most studies included patients with any skin disease;[18,19,21,22,24,26] one study targeted two other skin diseases (pediculosis, tinea capitis) aside from scabies,[23] and only one study included scabies alone since they were recruiting for an RCT of an herbal intervention.[25] The type of scabies, whether classic or crusted, was not stated in all studies, but one study's definition (presence of rashes, pustules or mite burrows on the hands, arms and feet of the participants was done through visual examination using a magnifying lens; history of itchiness on the lesions especially at night) was compatible with classic scabies.[23] Only pediatric patients were included in four studies,[19,21,23] while one study only included elderly patients;[25] the rest did not limit by age group. All studies included both sexes, although two of three orphanages in one study included only girls (Marillac Hills) and only boys (Manila Boys Town).[23] Four studies subgrouped by age group and sex,[18,19,21,23] while one study subgrouped by religion (Muslim and Christian).[18] Two studies measured monthly prevalence.[18,19]

Risk of Bias of Included Studies

The five retrospective chart review or census studies fulfilled at least half of the nine criteria for risk of bias using the JBI checklist (Appendix 6).[18–21,23] The median number of criteria fulfilled was 6 (range 5 to 7). All studies had adequate reporting of criteria 1 to 3 (sample frame and size, recruitment), 5 (coverage), and 8 (statistical analysis), while none of the studies exhibited a standard and reliable way of measuring the condition of the participants (criteria 6 and 7).

Among the four population-based studies, only one fulfilled at least more than 50% of criteria with a score of 8/9.[23] The number of fulfilled criteria in the other three studies ranged from 0 to 2. All four studies did not report interrater reliability testing for the outcome measurement method.

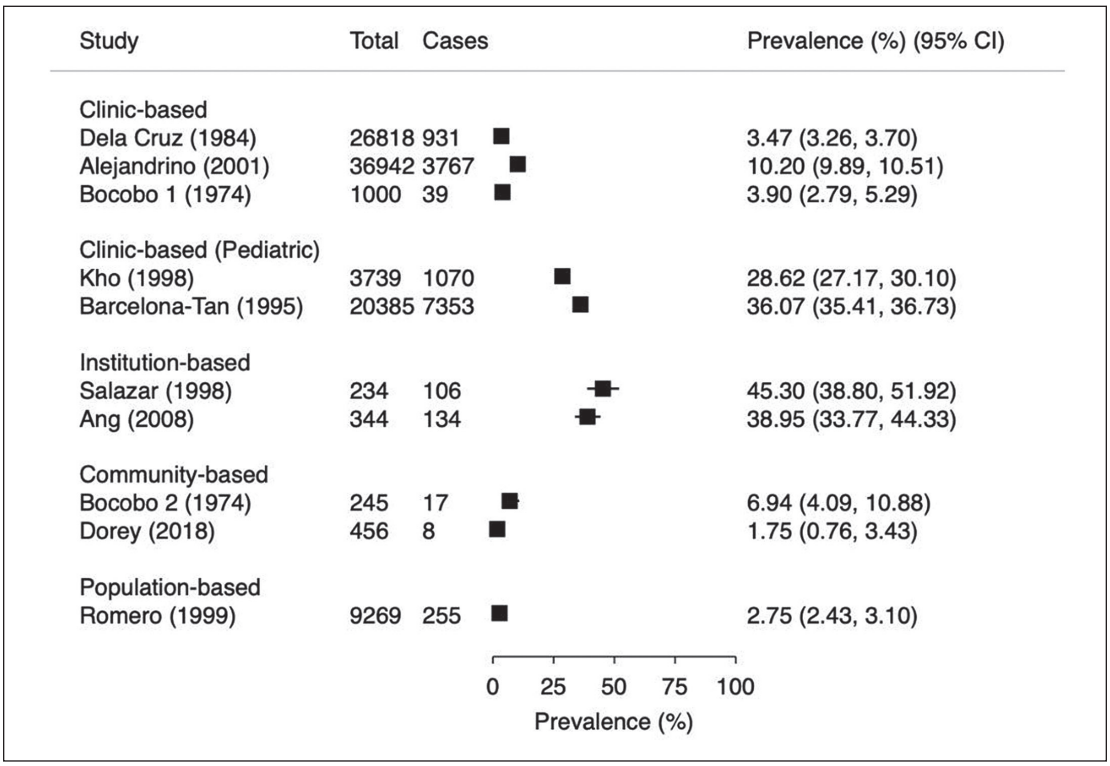

Figure 2. Forest plot for prevalence of scabies cases, subgroup by setting.

Epidemiologic Data

Prevalence was high (>10%) for institution-based studies (range, three orphanages, 39.0 to aged care home, 45.3%)[23,25] (Figure 2), followed by clinic-based retrospective chart reviews (0 to 14 y/o) and an urban tertiary government referral and private university-based training hospital (range 28.6% to 36.1%).[19,21,26] On the other hand, there was moderate prevalence in the Zamboanga study that included all age groups, ranging from 3.9% (2 general hospitals) to 6.9% (community-based).[22] There was only one national prevalence survey that also showed moderate prevalence at 2.75%.[24] The lowest prevalence was in a humanitarian medical mission that included only pediatric patients (0 to 14 or 18 y/o) (1.8%).[20] There were no scabies cases seen in 208 inpatients at a private university hospital.[26]

Prevalence was high for the age group 0 to 14 yrs. in four studies; with a median prevalence of 32.3% (IQR,11.5; range, 26.3 to 50.0) (Figure 3; Appendix 7).[18,19,21,23] For 15 y/o and above, the prevalence was moderate (range 5.8 to 7.39%).

The median prevalence in males was higher (34.0%; IQR 16.1; range, 12.5 to 60.8) than in females (26.2%, IQR 7.1; range, 9.0 to 35.5%) based on the same four studies but is inconclusive due to overlapping confidence intervals (Figure 4).

In one study in Zamboanga, the prevalence of scabies in Muslims was higher (8.7%, 95% CI 4.3, 15.4) than Christians (3.3%, 95% CI 2.2, 4.7) but the confidence intervals were overlapping.[22] Seasonal prevalence was reported in a clinic-based retrospective chart review among all age groups; highest in January (<12%) and lowest in June (<8%).[18] while another clinic-based review among pediatric cases reported a steady trend throughout the year.[19] The institution-based survey showed high prevalence in the Manila Boys Town (77.5%) followed by Haven for Children (mixed sex) (56.5%); Marillac Center (girls only) had moderate prevalence (4.1%). Interestingly other co-endemic infections showed similar male predominance for tinea capitis (males, 58.4% vs females, 20.1%) while the opposite trend was found for pediculosis (males, 0.8% vs females, 74.9%) in the three orphanages.

DISCUSSION

The prevalence of scabies in this study ranged from moderate (between 2 and 10%) in a private university hospital dermatology clinic, community-based and national surveys, to high (>10%) among pediatric patients in clinic-based retrospective chart reviews and institution-based surveys, and a tertiary government university training hospital dermatology clinic. The most affected age group was from 0 to 14 y/o. The cooler month of January had higher prevalence than the hotter month of June in one study. There were no inpatient cases of scabies in one private university hospital. There were no incidence studies found in our search.

Although there was a general downturn in scabies prevalence and incidence worldwide from 1990 to 2017 based on the GBD,[27] there were still reported epidemics in

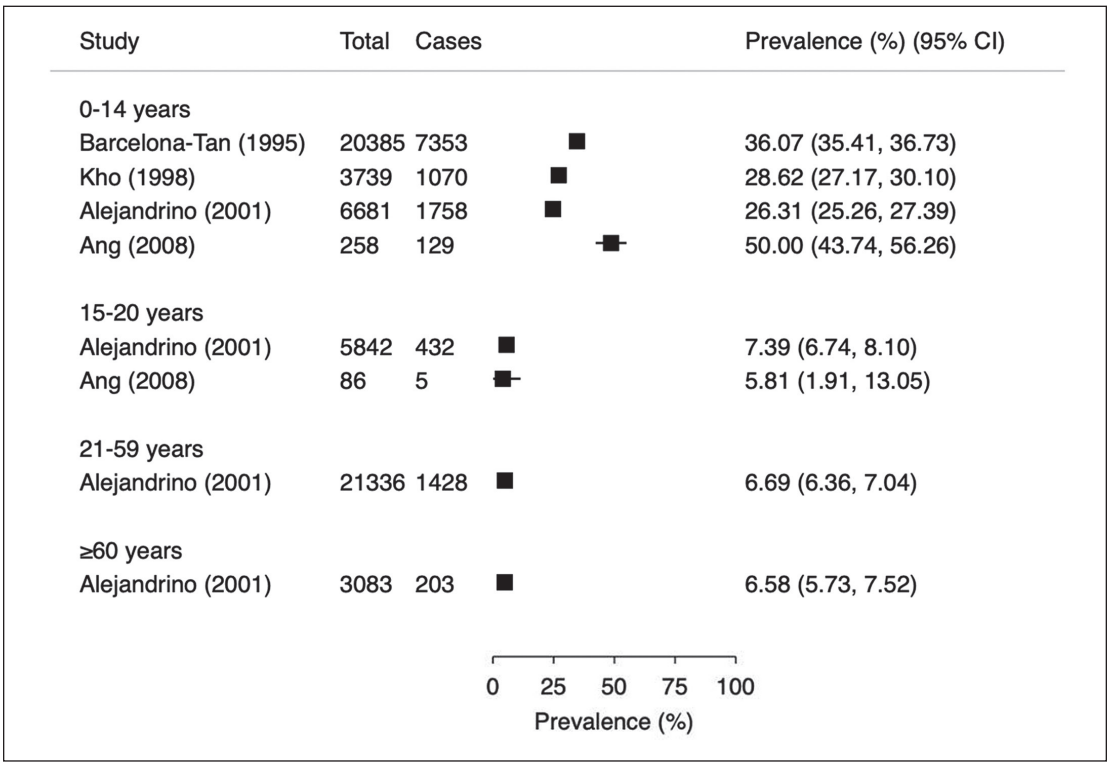

Figure 3. Forest plot of prevalence, subgroup by age group.

urban settings, among migrants and ageing population (>70 y/o). The national population-based survey prevalence in our review (2.75%) was lower than Australia (4.2%), the country with the lowest prevalence among general population-based studies in a 2023 systematic review on prevalence studies worldwide.[7] However, there are institutions (orphanages and aged care homes) and settings (tertiary hospital dermatology clinics) that still showed high prevalence in the Philippines.

The highest prevalence in our study were children 0 to 14 y/o, which was also found in a 2023 systematic review where 5 of the 43 included studies collected age-specific data and showed higher prevalence among children < 20 y/o than those > 20 y/o (Fiji Islands, Liberia, Solomon Islands, Vanuatu).[7] Children have relatively thinner skin and are more susceptible to infestation by scabies mites. In addition, children are more physically active and may have frequent skin-to-skin contact when playing or interacting in the school and community.[28]

The median prevalence among children in clinic-based settings in our study (38.3%) was closest to that of Pakistan, however, it was conducted among schoolchildren (40.9%).[29] The burden of disease for scabies is negatively correlated with sociodemographic index (SDI). Based on GBD 2017, the Philippines has a slightly higher sociodemographic index (SDI >0.6) than Pakistan (SDI >0.5%), yet has higher age-standardized DALYs for scabies.[30] In addition, the Philippines also has a higher sanitation rate (91.4%) than Pakistan (70.1%), poor sanitation being one of the known risk factors for scabies.[31] This suggests that scabies control programs should target the younger population, preferably in the school setting. The uptrend in uptake of the Water, Sanitation, and Hygiene (WASH) program in Philippine schools being monitored by the Department of Education from 2017 (6%) to 2020 (26.5%) is a good prevention measure for highly transmissible skin infections such as scabies. The high prevalence in one aged care home may be due to the thinner skin of elderly patients and different clinical presentation (e.g., lack of itching or atypical locations) that precludes early detection.[32]

The seasonal prevalence in the dry or cooler months in our study paralleled the trend in a study from Guinea-Bissau (dry season, 5.2% [56/1062] vs wet season, 1.9% [6/320])[33] and a 14-year national population database study in Taiwan with the incidence of scabies being negatively correlated with temperature ($\gamma = -0.152$, $p < 0.001$), but positively correlated with humidity ($\gamma = 0.192$, $p < 0.001$).[34] Being a tropical country with a vast coastline, the Philippines is vulnerable to climate change; in particular, the mean annual temperature is projected to rise by about 3.7°C on average from 1990 to 2100.[35] In addition, relative humidity increased during the wet season, peaking in August 2013 and July 2014, in a 1-year meteorological study.[36] This coincides with the peak months in the previous epidemiological study on scabies from local patient registries.[12]

Our findings for clinic-based retrospective chart review (all age groups) studies showed moderate prevalence (4.0 to 6.8%), which is similar to a study included in the systematic

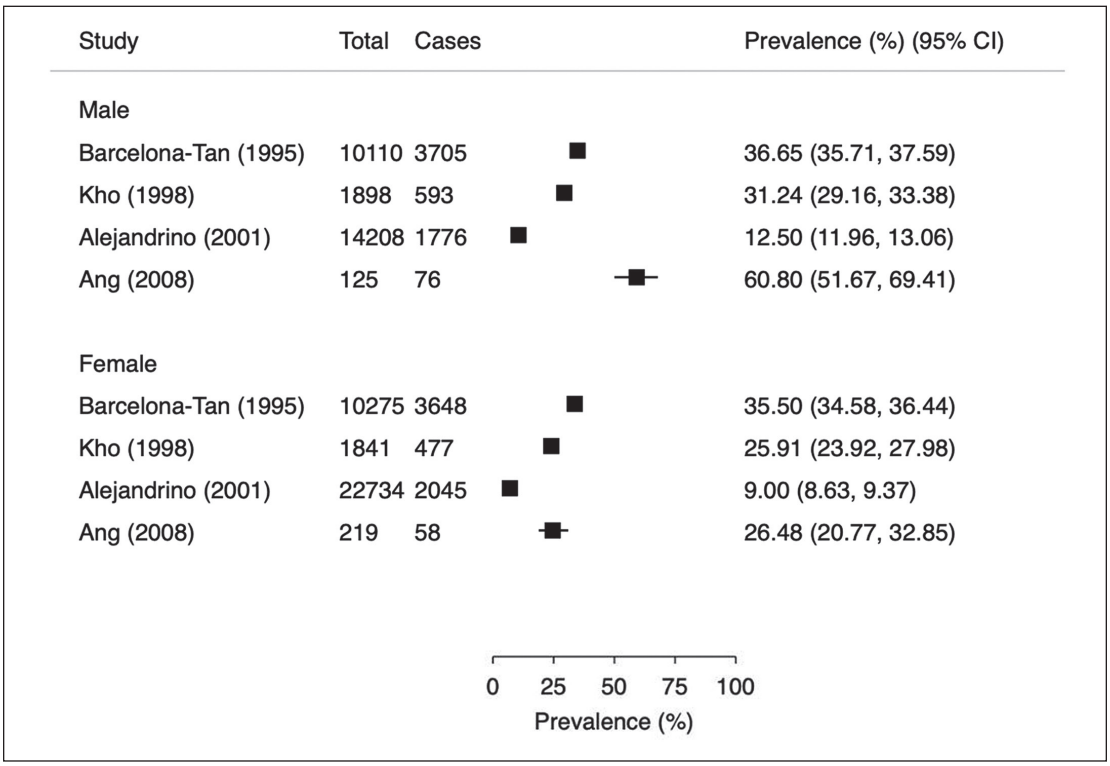

Figure 4. Forest plot of prevalence, subgroup by sex.

review by Khoobdel et al. (2023) in a dermatology clinic in Hormozgan, Iran (4.04%).[37] As in our study where prevalence in children in orphanages had high prevalence (39%), institutionalized individuals (i.e., prisoners in Hormozgan, Iran) similarly showed high prevalence: 56.7%.[38] In a medical mission in a Philippine jail, 58% of inmates had scabies infestation.[39] Crowded settings should be monitored closely for epidemics.

Another systematic review showed that the pooled prevalence of scabies among all age groups in Ethiopia was 14.5% (95%CI: 1.5, 27.6%). Quality appraisal using the JBI checklist showed one low quality study (score less than 5) and upon sensitivity analysis excluding this study, there was no significant difference in pooled prevalence from main analysis. Subgroup analysis showed the highest pooled prevalence of scabies in younger age groups at 19.5% (95% CI: 0, 41.9).

Overall Completeness and Applicability of Evidence

We searched three major databases, including the local Philippine health research database and registry, contacted authors and organizations, and hand searched relevant journals and other secondary sources. However, we were not able to retrieve the full reports of eight studies, which may reveal other trends in prevalence or incidence than what we found. The highest number of patients was in an abstract of a medical records review of 22,762 Filipino patients with skin diseases affecting the hands that showed scabies to be the most common dermatosis (NCR-JRRMMC-09071210092289). Only two other abstracts (total N=114) contained the number of patients while the rest did not state this information.

The included studies had a variety of settings aside from dermatology clinics, thus, enabling a wider scope to estimate the prevalence of scabies in institutions or endemic communities. However, there were no incidence studies based on longitudinal databases that limits information on scabies transmission dynamics.

Certainty of Evidence

The overall certainty of evidence was rated as low due to downgrading 1 level each for risk of bias (mostly due to lack of standardized diagnostic criteria for scabies, and validated measurement) and indirectness (since the study population was mostly clinic-based and not derived through random sampling of the general population). This means that the true prevalence estimates may substantially differ from those reported in the included studies. Misdiagnosis may occur if there is no standardized set of criteria used. The International Alliance for the Control of Scabies (IACS) criteria only came out in 2020, which is after the publication dates of included studies in this review.[40] All studies did not do interrater reliability testing for the outcome measurement, which is critical in prevalence studies, especially since the diagnosis of scabies is mainly through clinical findings. In addition, since the precision of the prevalence estimate is not explicitly stated, the imprecision criterion cannot be assessed. Decision thresholds for starting surveillance or tailoring management approaches may thus be unclear. Inconsistency was not downgraded since we did not pool studies due to clinical heterogeneity. Publication bias could not be detected using statistical tests since we did not pool studies. Roughly looking across the prevalence estimates, however, high prevalence estimates is not limited to small studies but occur across the studies with a wide range of sample sizes (around 200 to 36000).

Potential Bias in Review Process

Potential bias includes selection bias and information bias. Selection bias within individual studies may occur when those who participate (responders) are different from non-responders. Information bias occurs when the accuracy and reproducibility of the measurement of the condition is affected by systematic errors. Poor reporting of diagnostic methods used in the individual studies may either under- or overestimate the true prevalence. Overestimation may occur due to the lack of clear diagnostic criteria such that many cases are misdiagnosed as scabies, while the opposite is true if there is a low index of suspicion. In addition, since most studies in our review were clinic-based, there is likely an underestimation of the true prevalence since people in resource-poor and remote communities may have 'normalized' scabies or have limited access to effective and affordable medicine, thus ignoring the disease rather than seek treatment.[41] High clinical heterogeneity in the settings and patient populations in the included studies precluded a pooling of the prevalence; thus, we only gave a narrative description and correlated median prevalence and settings through eyeballing.

Strengths

This is the first systematic review on prevalence or incidence of scabies in the Philippines. Mapping the burden of disease is the first step in the recommended framework for scabies control by the expert panel convened by the World Health Organization in 2019.[42] As the Philippine Department of Health embarks on a burden of disease estimation project, and with scabies as one of the priority skin diseases, epidemiologic studies would help provide data that can eventually be used to estimate DALYs. We searched for grey literature to reduce possibility of publication bias and were able to include one unpublished study from secondary sources. We used a validated checklist to appraise the quality of the prevalence studies to identify which study methods need to be improved to increase validity of collected data. Since most studies fulfilled less than 50% of checklist criteria, the findings must be viewed with some caution as this indicates lower confidence in the accuracy of the estimates.

Limitations

As most studies were retrospective chart reviews whose quality largely depends on the integrity of data abstraction,

unclear description of abstraction methods may undermine the validity and reliability of data. Lack of clear diagnostic criteria in most studies and reliance on physician diagnosis may result in either overestimation, if some other cases or misdiagnosed as scabies, or underestimation, if scabies are misdiagnosed as other cases. All studies were conducted prior to 2020, when the diagnostic criteria for scabies were created by the International Alliance for the Control of Scabies.[40] Only one study was a cross-sectional survey that also determined risk factors, knowledge, attitudes, and practices; more of these studies should be conducted in different population groups and settings. Lack of full reports for seven studies were mostly theses or dissertations that were physically located in academic or government institutions for which we did not have access, including a study of 22,762 patients with skin diseases of the hand, and 5512 patients with skin diseases in leprosy-endemic areas. Despite thorough search in available websites, email requests to HERDIN and respective institutional libraries, we were not able to procure full reports. Although we cannot speculate on the impact of these missing data on our results, these reports once available may be included in an update of this systematic review.

Implications for Policy and Research

A national prevalence survey of skin diseases, focusing on scabies and other skin NTDs that are common in the underprivileged, needs to be done, as the last one by Romero et al. in 1999 is almost 25 years ago. Survey findings may be used to devise strategies for control programs aimed at reducing the prevalence and economic burden in high-risk areas. Integrated surveillance for skin NTDs have been shown to reduce the time and resources for mapping other locally co-endemic skin diseases such as leprosy, head lice, and yaws.[43]

CONCLUSION

There are limited local epidemiologic studies on scabies, which are mostly clinic-based and poorly generalizable to the national population or major island populations. Based on low certainty evidence, scabies seems to be common in the Philippines, especially among children and elderly and in institutional settings, and during the month of January.

Recommendations

We recommend to do another national prevalence survey with cluster-random sampling to identify high-risk areas especially in crowded settings (e.g., orphanages and aged care homes) and vulnerable populations (e.g., children and elderly) so they can be monitored and targeted for mass drug administration, if appropriate.[44] Incidence should also be measured to guide disease modelling and budget planning. An update of this systematic review once unretrieved full reports become available may be done. Future epidemiologic studies should also conduct surveillance with other co-endemic skin infections as part of an integrated skin NTD control program. This information can be used for estimating the burden of disease for scabies and other skin NTDs and guide appropriate health resource allocation.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

All authors declared no conflicts of interest.

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APPENDICES

Appendix 1. Search strategies for electronic database search

A. MEDLINE (PubMed)

Search number	Query	Results
10	(#1 OR #3 OR #5) AND #4	11
9	#5 and #7	1
8	#6 and #7	3
7	#2 and #4	20
6	#5 or #3	6,726,127
5	clinical trial[Publication Type]	952,080
4	"Scabies"[MeSH Terms] OR "Sarcoptes scabiei"[All Fields] OR "Sarcoptes scabiei"[MeSH Terms] OR scab*	9,936
3	((("randomized controlled trial"[Publication Type] OR "randomized controlled trials as topic"[MeSH Terms] OR "randomized controlled trial"[All Fields] OR "randomised controlled trial"[All Fields] OR ("controlled clinical trial"[Publication Type] OR "controlled clinical trials as topic"[MeSH Terms] OR "controlled clinical trial"[All Fields])) AND "pt"[All Fields]) OR "randomized ab"[All Fields] OR "randomised ab"[All Fields] OR "placebo ab"[All Fields] OR "drug"[All Fields] OR "groups ab"[All Fields]) NOT ("exp"[All Fields] AND ("animals"[MeSH Terms:noexp] OR "animals"[All Fields]))	6,234,490
2	Philippine* or Filipin*	27,354
1	prevalence or incidence or epidemiol* or survey or "rapid assessment" or "situation assessment" or "situational assessment" or RAR or cohort or surveillance or seroprevalence or seroincidence or seroepidemiol* or screening or exp epidemiologic methods/ or exp epidemiologic studies/ or exp sentinel surveillance/ or exp seroepidemiologic studies/ or exp cohort studies/ or exp cross-sectional studies/ or exp longitudinal studies/ or exp follow-up studies/ or exp prospective studies/	10,466,616

B. Scopus: scabies AND (Philippin* or Filipin*) 15 records
C. Herdin: 'scabies' 57 records

Appendix 2. List of Hand Searched Journals, Physical Libraries, and Websites; Contacted Individuals and Organizations (Grey Literature)

Journals	
Journal of the Philippine Dermatological Society (JPDS)	1992-2021
Journal of the Philippine Pediatric Society (JPPS)	1976-2018
The Filipino Family Physician Journal (FFPJ)	1991-92; 1998-99; 2001-2; 2007-8; 2013-2017; 2020-21
Pediatric Infectious Disease Society of the Philippines Journal (PIDSPJ)	2014-2021
Websites	
Theses/dissertations	UP Manila Thesis/dissertations (http://ilib.upm.edu.ph/)
International conference abstracts/Research fora abstracts	ICD 2021, PDS (2014, 2015, 2017, 2019, 2021), PAFP (2012 to 2015), PPS (2016 to 2021); RCD 2012
Physical Libraries	
College of Nursing, UP Manila	G/F, Sotejo Hall, College of Nursing, UP Manila Compound, Pedro Gil St., Ermita, Manila
College of Pharmacy, UP Manila	G/F, Valenzuela Hall, Taft Ave, Ermita, Manila
College of Public Health, UP Manila	G/F, Lara Hall, Pedro Gil St. Ermita, Manila
Department of Clinical Epidemiology, College of Medicine, UP Manila	G/F, Paz Mendoza Building, Pedro Gil St., Ermita, Manila
National Graduate of Health Sciences, UP Manila	3/F, Joaquin Gonzales Building, Padre Faura, Ermita Manila
Organizations*	
Philippine Dermatological Society and affiliated institutions	https://pds.org.ph
Philippine Academy of Family Physicians	https://thepafp.org/
Philippine Pediatric Society	https://pps.org.ph/

**List of individuals may be available upon request*

ICD, International Conference of Dermatology; PD, Philippine Dermatological Society; PAFP, Philippine Academy of Family Physicians; PPS, Philippine Pediatric Society; RCD, Regional Congress of Dermatology

Appendix 3. List of Studies Without Full Reports (k=7)

Author, Year	P	Outcome	N
1. Dignadice, 2006[45]	Grade six pupils in X Elementary school	Dominant health problems	No data
2. Macalino, 2007[46]	Residents of Malabon, Pampanga, and Olongapo City	Common flood-related skin infections	No data
3. Usman, n.d.[47]	Child laborers in Barangay Bangkal, Patikul, Sulu	Health condition	No data
4. Aquino, 2016[48]	Children in Mahayag, Zamboanga del Sur	Common skin conditions	36
5. Jamsuri, n.d.[49]	Street children in Zamboanga City	Health condition	78
6. Dofitas 2000[50]	Six leprosy-endemic areas in Philippines	Common skin diseases	5121
7. JRRMMC, 1999[51]	Available medical records of Filipino patients, with skin diseases affecting the hands, seen on an out-patient basis at the Department of Dermatology of the Jose R. Reyes Memorial Medical Center from July 1, 1996 to June 1999	Skin diseases that affect the hand	22,762

Appendix 4. List of Excluded Studies (k = 14)

Study ID	Study design	Reason for Exclusion
1. The Filipino Family Physician, 1975[11]	Meeting Report	No numerator/denominator for prevalence
2. Concepcion et al., 1999[51]	RCT	No denominator for prevalence (no indicated population of patients at risk)
3. Simuangco, 1975[52]	Retrospective records review	No data on prevalence/incidence
4. Santiago, 2004[53]	Meta-analysis	No data on prevalence/incidence
5. Felicen et al., 2003[54]	Non-RCT	No data on prevalence/incidence (no indicated population of patients with no scabies)
6. PITAHC & UPM, 2000[55]	Ethnopharmacological study	No data on prevalence/incidence
7. Castillo, 2013[56]	RCT	No data on prevalence/incidence
8. Mitchell, 2022[57]	Systematic scoping review of qualitative studies	No data on prevalence/incidence
9. Alinsug, 2022[58]	Ethnopharmacological study	No data on prevalence/incidence
10. Quijano, 2016[59]	Cross-sectional study	No numerator/denominator
11. Besa, 2015[60]	RCT	No data on prevalence/incidence
12. Encarnacion, 1998[61]	Retrospective records review	No numerator/denominator
13. Legarda-Montinola, 1998[62]	Case report	No data on prevalence/incidence
14. Gochoco, 2021[63]	Case report	Retracted

Appendix 5. Characteristics of Included Studies (9 studies; N=79,065)

Study ID	Study design	Location	Setting	Years	Study population	Methods of Diagnosis	Outcome (prevalence, incidence, etc.)	No. of patients with scabies	Total no. of cases	%
1. ***Alejandrino & Lao, 2001***[18]	Retrospective chart review	Metro Manila	Dermatology department, Tertiary government hospital (UP-PGH)	Jan 1996 to Dec 1999	New patients with skin disease	Not stated	Clinic-based prevalence	3767	36,942	10.197%
2. ***Ang et al., 2008***[23]	Cross-sectional study	Metro Manila	Manila Boys Town and two DSWD institutions I (Haven for Children and Marillac Hills)	September 2007-February 2008	Residents aged 0-18 y/o	Typical lesions in typical distribution and nocturnal itch	Institution-based prevalence	344	134	38.95%
3. ***Barcelona-Tan et al., 1995***[19]	Retrospective chart review	Metro Manila	Outpatient clinic of dermatology department(JRRMMC)	August 1992 to July 1994	Patients with skin disease aged 0-14	Not stated	Clinic-based prevalence	7353	20.385	36.07%
4. ***Bocobo & Mercado, 1974***[22]	Retrospective chart review (Group 1)	Zamboanga Peninsula Region	Group 1: OPD of Zamboanga General Hospital and Brent General Hospital	1971-1972	Patients seen at hospital OPD (1000 consecutive patients)	Not stated	Clinic-based prevalence	Group 1 39	Group 1 1000 (1280 diagnoses)	Group 1 3.9%
	Cross-sectional study (Group 2)		Group 2: 5 Muslim barrios**		Residents of barrios	Case finding by a survey team; unclear	Community-based prevalence	Group 2: Muslim 17	Group 2: Muslim 245	Group 2 6.9%
5. ***De la Cruz & Montinola, 1984***[26]	Retrospective chart review	Metro Manila	Outpatient dermatology clinic (STUHCH-OPD) (mostly low-income and middle-income groups of Sampaloc area)	1983	Patients diagnosed with skin disease (outpatient)	Not Stated	Clinic-based prevalence	56	5266	1.06%
		Metro Manila	Outpatient dermatology clinic (STUHCH-OPD)	1972-1982		Not stated	Clinic-based prevalence	875	21552	4.06%
			Inpatient (dermatology service)	1979-82	Patients diagnosed with skin disease (in-patient)	Not stated	Hospital-based prevalence	0	208	0%
6. ***Dorey et al., 2018***[20]	Retrospective review	Western Visayas Region (Panay Islands***)	Humanitarian assistance mission by Pacific Partnership	2015	Pediatric patients seen at a medical mission 0-18 y/o	Not stated	Clinic-based prevalence	8	456	1.8%
7. ***Kho & Aportedera, 2000***[21]	Retrospective chart review	Davao region (Davao City)	Out-patient sections of Department of Dermatology, (Davao Medical Center)	Jan 1 1996 to Dec 31 1999	Patients diagnosed with skin disease aged 0-14	Not stated	Clinic-based prevalence	1070	3739	28.62%
8. ***Romero et al., 1999***[24]	Cross-sectional study	National prevalence survey	24 clusters of 1000 households (3 strata – Metro Manila, other urban areas, rural areas)	Not indicated	Cluster-random sampling from national population (0 - >50 y/o)	Dermatologic examination by a 2nd year dermatologic resident	Population-based prevalence	255	9,269	2.8%
9. ***Salazar et al., 1997***[25]	RCT	Metro Manila	Aged home (Elsie Gaches Center)	1986	Residents of aged home	Clinically diagnosed, Unclear	Institution-based prevalence	106	234	45%

* *Metro Manila, Metro Cebu, Cagayan de Oro, Bulacan, La Union, Oriental Mindoro, Camarines Sur, Tarlac, Cavite, Sorsogon, Iloilo, Negros Occidental, Cebu, Misamis Oriental, Agusan del Sur*

** *Campo Islam, Campo Muslim, Rio Hondo, Taluksangay and Landang Laub*

*** *Cuartero (77), Culasi (91), Loctugan (206), and Sigma (82)*

Appendix 6. Risk of bias summary

Study ID	Item 1 Sample Frame	Item 2 Recruitment	Item 3 Sample Size	Item 4 Subjects/ Setting	Item 5 Coverage	Item 6 Valid Identification	Item 7 Standard Measurement	Item 8 Statistical Analysis	Item 9 Response Rate	Total no. fulfilled (out of 9 points)
Retrospective census/chart reviews										
1. Alejandrino and Jao, 2001[18]	Y	Y	Y	Y	Y	U	U	Y	Y	7/9
2. Barcelona-Tan, J., & Roxas-Rosete, C., 1995[19]	Y	Y	Y	Y	Y	U	U	Y	Y	7/9
3. De La Cruz and Montinola, 1984[26]	Y	Y	Y	N	Y	U	U	Y	U	5/9
4. Dorey et al., 2018[20]	Y	Y	Y	Y	Y	U	U	Y	Y	7/9
5. Kho Jr and Aportedera-Allado, 2000[21]	Y	Y	Y	Y	Y	U	U	Y	Y	7/9
Total no. of studies that fulfilled criteria	5/5	5/5	5/5	4/5	5/5	0/5	0/5	5/5	4/5	
Population-based studies										
6. Ang et al., 2008[23]	Y	Y	Y	Y	Y	Y	U	Y	Y	8/9
7. Bocobo and Mercado, 1974[22]	U	U	U	N	U	U	U	N	U	0/9
8. Romero et al., 1999[24]	Y	U	U	Y	U	U	U	N	U	2/9
9. Salazar et al., 1987[25]	U	N	N	N	U	Y	U	N	Y	1/9
Total no. of studies that fulfilled criteria	2/4	1/4	1/4	2/4	1/4	2/4	0/4	1/4	2/4	

Appendix 7. Subgrouped Epidemiologic Data

A. By Age Group

Age (yrs.)	No. w/ scabies/Total at risk (%, 95% CI)			
	Alejandrino & Lao, 2001	Ang et al., 2008	Barcelona et al., 1995	Kho & Aportedera, 2000
0-1	481/1198 (40.2%, 37.4, 43.0)	47/53 (88.7%, 77.0, 95.7) *(0 to 7 yrs.)*	2451/7251 (33.8%, 32.7, 34.9)	608/1866 (32.6%, 30.5. 34.8) *(0-2 yrs.)*
1-4				
5-9			2600/6789 (38.3%, 37.1, 39.5)	354/1232 (28.7%, 26.2, 31.4) *(3 to 9 yrs.)*
8-11		59/79 (74.7%, 63.6, 83.8)		
10-14			2302/6340 (36.3%, 35.1, 37.5)	98/540 (18.0%, 15.0, 21.7)
2-13	1277/5483 (23.3%, 22.2, 24.4)			
12-15		23/126 (18.3%, 11.9, 26.1)		
16-18		5/86 (5.8%, 1.9, 13.1)		
14-20	432/5842 (7.4%, 6.7, 8.1)			
21-59	1428/21336 (6.7%, 6.4, 7.0)			
60 and up	203/3083 (6.6%, 5.3, 7.5)			

B. By Sex

Sex	No. w/ scabies/No. at risk (%, 95% CI)				Median (IQR)
	Alejandrino & Lao, 2001	Ang et al., 2008	Barcelona et al., 1995	Kho & Aportedera, 2000	
Male	1776/14208 (12.5%, 12.0, 13.1)	76/125 (60.8%, 51.7, 69.4)	3705/10110 (36.7%, 35.7, 37.6)	593/1898 (31.2%, 29.2, 33.4)	33.95 (16.13)
Female	2045/22734 (9.0%, 8.6, 9.4)	58/219 (26.5, 20.8, 32.9)	3648/10275 (35.5%, 34.6, 36.4)	477/1841 (25.9%, 23.9, 28.0)	26.20 (7.06)

C. By Religion

Religion	No. w/ scabies/ No. at risk (%)
	Bocobo
Muslim	10/115 (8.7)
Christians	29/885 (3.3)