Scabies in the Philippines: A Secondary Analysis of Local Patient Registries

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ABSTRACT

Background. Scabies is the second most common cause of disability among skin diseases in the Philippines as of 2019. There is no large nationwide study describing the epidemiologic profile of scabies in the country.

Objective. This study aimed to describe the demographic, seasonal, and geographic profile of scabies in the Philippines.

Methods. We compared secondary data of two local patient registries (Philippine Dermatological Society, PDS, 2010 to 2021; and Philippine Pediatric Society, PPS, 2009 to 2021) for reported cases of scabies in the Philippines. We reported the frequency and percentage distribution according to age, sex, month, year, and type of diagnosis, and region.

Results. The median annual frequency of scabies cases (mostly outpatient) for PDS (from year 2010) was 4087 (range ([QR], 342-6422 [3271.5]), while it was 183 (range [IQR], 64-234 [96.5]) (all inpatient) for PPS (from year 2009). There was a reduction to one-third (PDS) and one-fourth (PPS) of pre-pandemic numbers during the pandemic years (2020-2021). The peak months for scabies cases were the cooler months: January (median, 12.1% of annual cases; range [IQR], 2.6%-31.4% [3.6%]) to February (median, 10.0% of annual cases; range [IQR], 1.5%-27.8% [2.5%]) based on PDS data, and November (median, 10.0% of annual cases; range [IQR], 0.0%-24.3% [7.0%]) to January (median, 9.0% of annual cases; range [IQR], 0.0%-24.3% [6.6%]) for PPS data. Overall, for PDS, age 1-4 years is the most affected age group (median, PDS, 17.5% of annual cases; range [IQR], 11.9%-25.4% [8.1%]), while it was the less than 1-year-olds (median annual cases, 48.9%; range [IQR], 29.1%-67.3% [13.20%]) among PPS pediatric population aged 0 to 18 years. Males (median, 53.9% of annual cases; range [IQR], 45.0%-67.2% [8.8%]) were more affected than females in PPS. While for PDS during earlier years (prior to 2015), males (median, 51.6% of annual cases from 2010 to 2014; range [IQR], 47.4%-52.9% [0.2%]) were more affected than females. However, males became less affected than females with median, 44.7% of annual cases from 2015 onwards (range [IQR], 43.4%-46.5% [1.2%]). NCR was the region with the highest frequency of cases in PPS (median, 52.6% of annual cases; range [IQR], 22.7%-75.0% [20.4%]). The 2nd most affected regions were Central/Eastern Visayas (34.2%, 2009-2013; range [IQR], 17.9%-54.1% [5.3%]), Bicol region (12%; 2014 to 2018; range [IQR], 17.9%-54.1% [7.4%]), Central Luzon (18%; 2019), Central/Eastern Visayas (29%, 2020), and Northern/Central Mindanao (17%, 2021).

Conclusion. Scabies was commonly seen in the younger age group, slightly more in females in the PDS, while slightly more among males in the PPS, in the cooler months of the year, and in the urbanized NCR.

Keywords: scabies, Philippines, epidemiology, database, registry, secondary data

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INTRODUCTION

Scabies is an ectoparasitic skin infestation that remains to be a highly prevalent infectious skin disease mainly in tropical countries. Scabies has been a public health problem in the Philippines as early as a 1918 census and a World War II US army personnel report.[1,2] In a World Health Organization (WHO) Regional seminar on tropical skin diseases in 1975, a 'scabies alert' was reported due to an ongoing epidemic in the Philippines and Hong Kong.[3] In 1975, a published review of reported cases in the Greater Manila Area (Philippine General Hospital, University of Santo Tomas Hospital Dispensary, private practice of Dr. FC Bocobo) showed that parasitic skin diseases ranked 4th or 5th among all dermatological cases.[4] A national prevalence survey of fungal and other skin diseases in 24 cluster sites throughout the Philippines (N=9259) published in 1999 showed scabies to be the 2nd most common dermatologic problem (prevalence 27.5/1000), next to arthropod bite reaction (30.7/1000).[5] In a community survey of households and individuals (N=5121) in six leprosy-endemic areas in in the Philippines from 1999-2000, infestations and insect bites accounted for the 2nd highest percentage (9.0%) of skin diseases in the communities, second only to superficial mycoses (18%); scabies accounted for 2.01%.[6] In both latter surveys, underreporting was noted since some participants refused to show certain skin areas. More recently, jail outbreaks have been reported in the news with the use of benzyl benzoate lotion reported as successful in eradicating scabies among inmates.[7,8]

The age group profile as of 2015 showed the biggest percentage from the 5-14 y/o (21%) and 15-24 y/o (20%) groups.[9] The Philippines has an estimated mid-year population of 109M (as of May 1, 2020, based from 2020 national census of population with estimated 1.63% growth rate from 2015 to 2020).[10] The Philippines has three big islands, Luzon (109,965 km^2), Mindanao (97,530 km^2), and Samar (13,429 km^2). The country has 17 administrative regions, 33 highly urbanized cities (HUCs), 108 component cities, five independent component cities, and 1,488 municipalities. The average population density of the country is 363 persons per square kilometer of land (as of 2020), with NCR as the most densely populated (21,765 persons per sq km), which is almost 60 times the average national level. Of the 33 HUCs in the country, half (16) were in the NCR.

The Philippines has a tropical and maritime climate characterized by relatively high temperature (average 26.6˚C, excluding Baguio City), high humidity (range, 71 to 85%) and abundant rainfall (annual, range 965 to 4,064 mm).[11] There are two major seasons in the country (based on temperature and rainfall): (1) the rainy season, from June to November; and (2) the dry season, from December to May. The dry season may be subdivided further into (a) the cool dry season, from December to February; and (b) the hot dry season, from March to May.

The top two most common diseases in the Philippines are infectious (acute respiratory infection, pneumonia) followed by hypertension.[9] Scabies is not a notifiable disease in the Philippines. In the 2020 Guidelines for Mandatory Reporting of Notifiable Diseases and Health Events of Public Health Concern Act, only hand, foot, and mouth disease, transmissible through direct skin contact, is identified as a priority disease for surveillance.[12]

The Philippines is ranked 9th among 195 countries worldwide in the disability-adjusted life years (DALYs) contributed by scabies based on Global Burden of Disease (GBD 2017).[13] Among the skin diseases in the Philippines, scabies constitutes the 2nd highest DALYs based on the latest GBD 2019.[14]

The public health control of scabies needs a 3-pronged approach: mapping of disease burden, delivery of interventions, and establishing monitoring and evaluation, as recommended in a framework drafted by an expert panel convened by the WHO in 2019.[15,16] As a first step to achieving the goals of the WHO Roadmap for NTDs aimed at ending the neglect to attain the sustainable development goals by 2030,[17] it is important to describe the epidemiology of scabies in the Philippines. This study aimed to determine the demographic, seasonal, and geographic profile of scabies through secondary analysis of local patient registries.

METHODS

This retrospective registry-based study was conducted from September 15 to December 15, 2022. It is part of the review of literature for a bigger research project (PhD dissertation of principal investigator), the protocol of which was submitted and approved by the University of the Philippines Research Ethics Board (UPM REB-2022-0055-01). The protocol for this substudy may be requested from the author. For this manuscript, we will describe only two patient registries that are managed by their respective specialty medical societies in the Philippines. We compared the trends in the two patient registries considering that they differ in case definition, patient population, setting, and geographic distribution. We did not pool them due to these differences. Succeeding publications will present data from government patient registries and surveillance data, as well as a systematic review of epidemiologic studies from the literature.

We extracted data from the following patient registries:

Philippine Dermatological Society Health Information System (PDS-HIS) *(2010 to present)*

The database was conceptualized in 2005 and includes data from most of the accredited training institutions beginning from 2010. The Philippine Dermatological Society (PDS) is the officially accredited specialty society for dermatology by the Philippine Medical Association (PMA) and currently has 1327 members in all 17 regions of the Philippines, majority of whom are in the NCR (754, 56.82%), and with

only one member in ARMM (personal communication, PDS Secretariat). The PDS members consists of graduates of residency training or mentorship from 13 training institutions (11 in the NCR, 1 in Region 1, and 1 in Region XI) (www.pds.org.ph, as of December 21, 2022). To the original 11 institutions, one institution in NCR in 2021 and one institution in Region 1 in 2022, were added. Although the PDS has four regional chapters (Southern Philippines, Northern Luzon, Southern Luzon, Central Luzon) as of 2022, these chapters are composed of private dermatologist members of PDS who do not contribute data to the PDS-HIS.

The PDS-HIS registry was created for purposes of research, lectures/reports, publications, public health reporting, health information and advocacy, healthcare operations, benchmarking, and quality monitoring. It contains the demographic profile (age, sex) and diagnosis of patients seen at the dermatology departments of the different training institutions for either outpatient, inpatient, emergency room, and inpatient referrals. Majority of cases are outpatient (99.5%) (personal communication, PDS-HIS committee). The PDS-HIS is searchable upon request from and submission of documentary requirements to the PDS-HIS committee. The data in the PDS-HIS is encoded by dermatology resident physicians of the PDS training institutions on cases seen in the following patient areas – emergency room, inpatient, outpatient, and is managed by a task force (members of PDS) together with an informatics consultant and systems administrator. The DermLex Version 1.0 (American Academy of Dermatology; DermLex: The Dermatology Lexicon) is a standardized terminology of dermatologic diagnoses, therapies, procedures, and laboratory tests that PDS-HIS recommends its encoders to use. In the earlier versions, however, the diagnoses were encoded free hand with no specific dropdown choices; recently, there are dropdown choices although encoder may still choose to enter a freehand diagnosis.[18] In 2010, only one institution (Philippine General Hospital, PGH) encoded data into the PDS-HIS as a test run. From 2011 to 2016, the 11 PDS-accredited institutions were all encoding data. Due to data privacy issues, in 2017, three institutions only partially encoded data, and in 2018, temporarily stopped encoding. A total of six institutions did not encode in 2019 until 2020 when only six institutions encoded data. By 2021, 10/12 institutions, and by 2022, 12/13 institutions were encoding data. We only included 'new cases' and excluded 'follow-up cases' (follow-up case defined as - if the patient was already diagnosed in a previous visit and just followed up, with the follow-up visit being not necessarily within the same year) to avoid double-counting the same case. Data collection in the PDS-HIS database was done through Excel files provided by PDS-HIS.

Philippine Pediatric Society (PPS) Registry of Childhood Diseases *(2006 to present)*

This registry has been maintained by the Philippine Pediatric Society since May 2006. It serves as a repository of monthly hospital ward discharges from the Philippine Pediatric Society Hospital Accredited Board (PPS-HAB) hospitals for children up to 18 y/o. The registry is searchable by ICD-10 code (diagnosis), age, sex, month/year, outcome, and region/hospital. By typing in the ICD code of the disease and selecting the desired filter, the number of cases over the total number of cases will be shown. The ICD-10 code for scabies is B86 and was used to encode the case into the registry. Scabies is defined as "A contagious cutaneous inflammation caused by the bite of the mite *Sarcoptes scabiei*. It is characterized by pruritic papular eruptions and burrows and affects primarily the axillae, elbows, wrists, and genitalia, although it can spread to cover the entire body."[19] The category of tertiary diagnosis (versus primary and secondary) was only added to the data collection form in 2019 to record chronic conditions. The Philippine Pediatric Society has 6,581 members (as of September, 2021) with members spread all over the country.[20] There are currently 12 PPS chapters representing all 17 regions of the country. A total of 117 hospitals contribute to the registry (NCR chapter, 55 hospitals; Northern Luzon chapter, 5 hospitals; Northeastern Luzon chapter, 3 hospitals; Central Luzon chapter, 9 hospitals; Southern Tagalog chapter, 6 hospitals; Bicol chapter, 2 hospitals; Negros Occidental/ Western Visayas chapter, 9 hospitals; Cebu Eastern/Central Visayas, 16 hospitals; Northern/Central Mindanao chapter, 5 hospitals; Davao/Southern Mindanao chapter, 7 hospitals;) contribute data to the registry.[21] The number of hospitals contributing data varies per month and ranged from 88 to 108 (from 2009 to 2021) (personal communication, Dr. Edilberto Garcia, Jr.). The registry is publicly accessible and searchable through the portal at https://pps.ivant.com/search.do. The PPS registry portal was manually searched to collect data in an Excel file, and was validated by the PPS registry head.

We extracted the number of scabies cases over the total number of cases (various diagnoses) seen. We then computed for the median (IQR) frequency and percentage of scabies cases per year for the two patient registries and compared them across month, year, age group, sex, type of diagnosis, outcome, region, depending on data availability. We used Microsoft Excel to compute for the frequency, percentages, medians, and ranges, while we used Stata Version 17.0 (Stata Corp)[22] to generate graphs showing the frequency or percentage distributions.

RESULTS

Overall, scabies cases accounted for 5.15% median annual percentage (range [IQR], 2.97%-8.81% [2.35%]) of all outpatient and inpatient cases of skin disease in PDS from 2010 to 2021, while it accounted for median 0.05% (range [IQR], 0.02%-0.11% [0.02%]) of all inpatients in PPS-accredited hospitals.

For PDS, the median annual frequency of cases was 4087 from 2010 to 2021, with a notable decrease by one fourth from pre-pandemic (2010-2019) (4227 cases) to pandemic

years (2020-2021) (1124 cases) (Table 1). There was also a declining number of cases even prior to the pandemic from peaking in 2014 (6422 cases), going down in 2021 to 1207 cases. It was noted that beginning in 2018, not all member institutions were able to contribute data due to changes in institutional policy regarding data privacy. An abrupt decrease in the number of cases were noted from March 2020 (red line), coinciding with the start of lock-downs due to the COVID-19 pandemic (Figure 1A).

In comparison, data from the PPS Registry (2009 to 2021) showed a median annual frequency of hospitalized cases of scabies at 183. The annual number of cases peaked in 2014 (was stable pre-pandemic (2010-2019) with a median annual frequency of 187 cases, while it was reduced to about one-third (65 cases) of pre-pandemic numbers during the pandemic (2020-2021) (Table 1). There was a nadir in the number of cases after the start of lockdowns (red line, March 2020) due to the COVID-19 pandemic (Figure 1B).

There is an observed seasonal nadir of cases around June of the year for both PDS (237 cases) (Figure 2A; Appendix Table A1) and PPS (6 cases) (Figure 2B; Appendix Table A2) data. The peak however was different: in January (479 cases) for PDS and November (20 cases) in PPS database, although both peaks represent the cooler months of the year.

In the PDS registry, during the pre-pandemic period from 2010 to 2019, the 1 to 4 y/o age group had the highest median annual percentage of cases (18.9%; range [IQR], 12.7%-25.4% [6.3%]). From 2020 to 2021, the highest

Table 1. Estimated Annual Frequency and Percentage Distribution of Scabies Cases in PDS (2010-2021) and PPS (2009-2021)

Year	PDS			PPS		
	Number of cases with scabies	Total number of cases seen	Percentage with scabies	Number of cases with scabies	Total number of cases seen	Percentage with scabies
2009	–	–	–	220	205784	0.11%
2010	342	9687	3.53%	**234**	336802	0.07%
2011	2366	68462	3.46%	229	330610	0.07%
2012	5340	78510	6.80%	152	323821	0.05%
2013	5371	60970	8.81%	151	342828	0.04%
2014	**6422**	83586	7.68%	227	364980	0.06%
2015	5780	92625	6.24%	183	338127	0.05%
2016	4327	91814	4.71%	187	380031	0.05%
2017	4127	93158	4.43%	131	414636	0.03%
2018	4046	72506	5.58%	230	403120	0.06%
2019	3294	54850	6.01%	100	446296	0.02%
2020	1040	24782	4.20%	66	180863	0.04%
2021	1207	40623	2.97%	64	115312	0.06%

Note: In bold font are peak number for each registry; PDS registry only started in 2010 with just one institution as a test run.
PDS, Philippine Dermatological Society; PPS, Philippine Pediatric Society

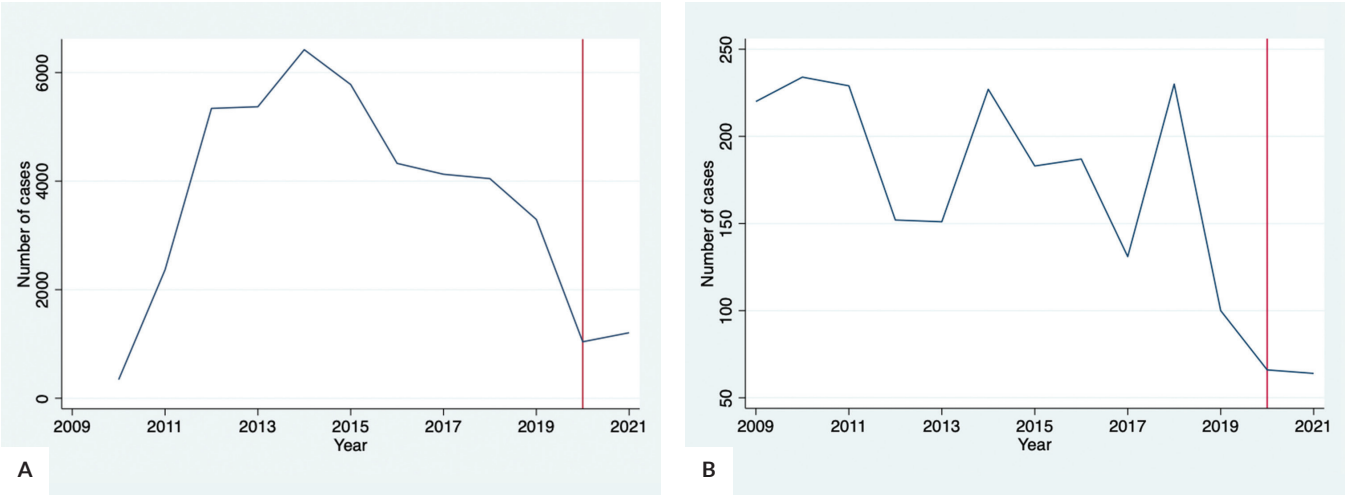

Figure 1. ***Annual time series of cases with scabies from 2009 to 2021.*** **(A)** Philippine Dermatological Society (PDS), **(B)** Philippine Pediatric Society (PPS).

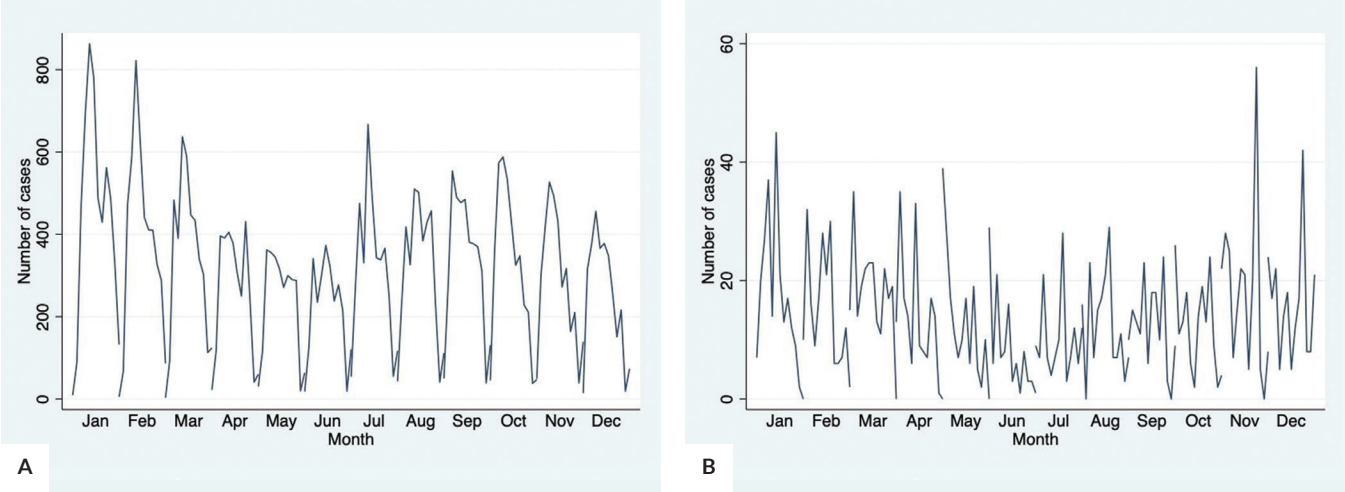

Figure 2. ***Cycle plot of distribution of patients with scabies from 2009 to 2021.*** **(A)** Philippine Dermatological Society (PDS), **(B)** Philippine Pediatric Society (PPS).

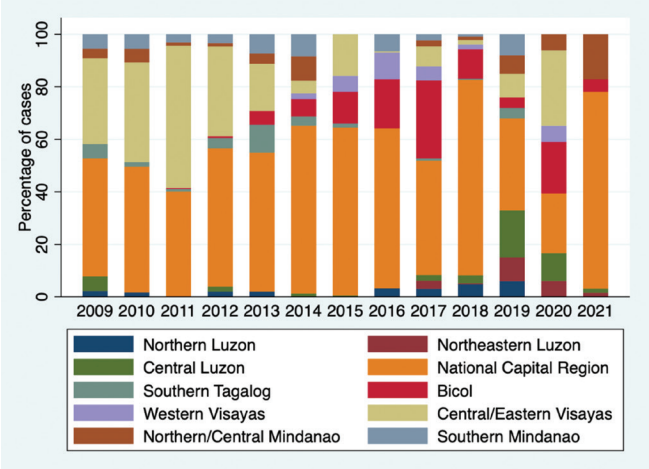

Figure 3. ***Annual distribution of patients with scabies as to region/Philippine Pediatric Society (PPS) chapter.***

Note: PPS chapters cover all 17 regions in the Philippines; each chapter may cover more than one political region. Northern Luzon – Region I and CAR; Northeastern Luzon – Region II and proximal areas of Ifugao and Kalinga-Apayao; Central Luzon – Region III; National Capital Region; Southern Tagalog – Region IV; Bicol – Region V; Western Visayas – Region VI; Central/Eastern Visayas – Regions VII and VIII; Northern/Central Mindanao – Regions IX, X, and XIII; Southern Mindanao – Regions XI, XII, BARMM, and parts of Zamboanga.

percentage of cases were in the 19 to 24 y/o (16.1% in 2020; 14.6% in 2021). Comparing among the patients included in the PPS registry, it has been consistent across the years that the highest number of cases were among infants (<1 y/o.) (median, 48.9%; range [IQR], 29.1%-67.3% [13.20%]), followed by toddlers (1-4 y/o.) (median, 27.2%; range [IQR], 9.0%-45.2% [4.20%]), except for the year 2018 where there were more cases seen among toddlers than infants (Appendix Table A3). Higher proportion of cases seen in infants in the PPS registry compared to PDS data may be due to the idea that infants are more likely to be brought to pediatricians for consultation even for skin conditions rather than to dermatologists.

From 2010 to 2016, there were 380 more cases of scabies infestation per year in the pediatric age group in the PDS data. However, beginning in 2017, as the trend shifted with a higher proportion of cases seen among adults, there were 223 more cases per year. Across all the years, the age group 1-4 y/o has the highest median of annual cases (17.5%; range [IQR], 11.9%-25.4% [8.1%]), followed by 5-9 y/o with 12.6% (range [IQR], 10.7%-14.2% [1.9%]). Among adults, the most affected age group is 19-24 y/o with 22.2% (range [IQR], 14.5%-26.7% [2.6%]; and median 10.2% overall; range [IQR], 7.3%-16/1% [2.1%]), followed by 25-29 y/o with 13.6% (range [IQR], 6.7%-18.2% [2.4%]; and median 6.3% overall; range [IQR], 3.4%-10.8% [1.7%]). Toddlers (1-4 y/o), have the highest median of 34.6% among all pediatric patients (range [IQR], 28.3%-44.9% [5.3%]).

It is to be noted that although number of scabies was decreased overall, there was a relative increase in the percentage distribution in the 19 to 44 y/o age group in PDS, from 2019 (1161/3260, 35.6%), the year right before the pandemic, to 2020 (426/1015, 42.0%) by 17.8% (Appendix Table A4).

In the PDS data, there were slightly fewer cases of scabies among males (20,351 males vs 22125 females; median M/F ratio, 0.9 (range [IQR], 0.8-1.1 [0.3]). However, from 2010-2014, there were slightly more cases among males (median M/F ratio, 1.1; range [IQR], 0.9-1.1 [0.1]) before switching to a higher number among females in 2015 and beyond (Appendix Table A5). In the PPS registry, there were generally more cases among males (1212 males vs 962 females; median M/F ratio, 1.2; range [IQR], 0.8-2.0 [0.5]), except in 2019 (M/F ratio, 0.8) (Appendix Table A5).

Most cases of scabies in the PPS registry were reported in Luzon, particularly in the National Capital Region, with a median percentage of 52.6% of annual cases; (range [IQR], 22.7%-75.0% [20.4%]) (Figure 3). From 2009 to 2013, the region with second highest number of cases were from Central/Eastern Visayas (34.2%; range [IQR], 17.9%-54.1% [5.3%]), followed by Bicol region (12.0%; range [IQR], 6.6%-29.8% [7.4%]) from 2014 to 2018. In 2019, the second-highest number of cases were in Central Luzon (18.0%); followed by Central/Eastern Visayas (28.9%) in 2020; and Northern/Central Mindanao (17.2%) in 2021. Almost all reporting institutions in the PDS, 10/11 from 2010 to 2019, and 11/13 thereafter, are based in the NCR, and are likely to represent patients in this region.

The percentage of scabies reported as the primary diagnosis (median, 43%; range [IQR], 40%-46% [4%]) in the PPS registry was initially lower than those reported as the secondary diagnosis from 2009 to 2016 (median, 49%; range [IQR], 54%-60% [4%]). However, it became slightly greater than those reported as secondary diagnosis from 2017 to 2020 (mean, 52%; range [IQR], 51%-68% [5%]). The category of tertiary diagnosis was only introduced in 2019 to account for chronic diseases, and there were three such cases in 2019, and 18 in 2021, which made up a third of the annual cases (Appendix Table A6).

Fourteen deaths among pediatric patients with scabies were reported in the PPS registry, with three deaths in 2011, three in 2012, and eight in 2018. No time-series trends were identified, and the cause of death may not be due to scabies, as it was not specified in the registry.

DISCUSSION

The median annual percentage of registry-reported scabies cases in the past decade ranged from 5.99% in outpatient and inpatient cases in all age groups (PDS) to 0.05% among inpatient pediatric cases (PPS). Cases were more frequent in cooler months and decreased significantly during the pandemic (2020-2021). The 19- to 44-year-old age group had a relative increase in percentage of cases (17.8%) during the pandemic in the PDS. Toddlers (1-4 y/o) were most affected in PDS and infants aged 28 days to 1 year in PPS. Males were slightly more affected than females in PPS and before 2015 in PDS. The NCR was the region with the highest frequency of cases in PPS, while majority of the reporting institutions to the PDS were from the NCR.

The higher percentage of cases in the PDS registry (5.99%) is explained by the inclusion of outpatient cases in this population. On the other hand, the low percentage among inpatient pediatric cases (0.05%) reflect the low hospitalization rate of scabies, as it is mostly managed in the outpatient setting. A more thorough investigation would need to conduct a survey among private clinics of dermatologists, especially those outside the NCR. In addition, the outpatient census of the pediatricians from PPS can also be surveyed to determine the percentage of scabies cases. Further exploration of the impact of this missing data may involve extrapolation of data and statistical modelling, and can be recommended for future studies.

The decrease in scabies cases in both PDS and PPS registries during the pandemic contrasts with studies in Europe. Although there was an overall decrease in the dermatologic consultations during the COVID-19 pandemic in several countries due to the lockdown policy, there was a general trend towards increased proportion of scabies cases. An increase in the proportion of scabies cases was observed in Turkey; in a dermatology outpatient clinic (N=376, from 1st to 30th April 2021) (10/9%) compared to previous years (2.8%, 2006 to 2017), based on Ministry of Health data,[23] and a tertiary medical center (N= 36,469).[24,25] There was also a fourfold increase in incidence of scabies in a representative national primary care database in Netherlands from 2011 (0.6 per 1000) to 2020 (2.6 per 1000).[26] This involved adolescents and young adults (15 to 29 y/o), which was hypothesized to be increased sexual intercourse due to increased sleepovers and confinement to homes from lockdown policies. Similarly in the UK, there was an increase in the prescription of oral ivermectin for difficult-to-treat scabies during March 2020 to July 2021 thought to be due to sharing spaces and working from home.[27] In our study, we also found an increase from prepandemic (2019) to pandemic (2020) years by 17.8% in the 19 to 44 y/o age group compared to the rest of the age groups (range, -33.1 to 1.2%). It is noted that this age group had increased mobility and potential in-person interaction as the Philippine government only allowed 21 to 59 y/o to leave their homes in March 2020.[28]

Seasonal distribution in our study follows the trends in other countries where the cooler season and autumn and winter months registered higher number of scabies cases such as South Korea,[29] Taiwan,[30] Iran,[31] and Israel.[32] A recent review of epidemiological studies on scabies from 2020-2022 comparing Europe with the rest of the world showed seasonality as contributing to the high incidence during the autumn and winter months.[33] A positive correlation with relative humidity and negative correlation with temperature was found in two population-based studies in Taiwan (14-year)[30] and northeast Poland (8-year).[34] Scabies mites were shown to have better survival with higher relative humidity and lower temperatures in an in vitro study.[35]

The low number of deaths in cases with scabies is noted in the PPS database. The GBD 2019 assumes a null mortality from scabies, although this may be an underestimation since it was noted that they did not include life years lost and limited consequences to skin involvement. However, post-streptococcal complications may also lead to deaths from cardiac or renal sequelae. Crusted scabies is associated with significant mortality in a hospital in Australia (30-day mortality rate of 2.5% of all admissions to hospital with severe or crusted scabies).[36] The mortality data from PPS did not specify the type of scabies as to classic vs crusted and it is

also possible that the death may not be due to scabies but an underlying or accompanying condition. Immunosuppression is a risk factor for crusted and severe scabies. In a prospective cohort of 78 patients with crusted scabies in Australia, identifiable immunosuppressive risk factors were identified in more than half of patients (eosinophilia, elevated IgE, leprosy).[37] There are a few case reports on crusted scabies associated with immunosuppressed conditions in the Philippines, one was in 2-year-old healthy infant with miliaria rubra given topical steroid and a 55-year-old with diabetes and hepatitis B.[38,39] In both cases, patients recovered from the scabies infestation. It is not possible to speculate on the cause of mortality in the reported cases in the PPS registry.

The highest median annual percentage of cases was seen in the 1 to 4 y/o age group (31%) in the PDS. In the PPS, the highest median annual percentage was among infants 1 month to 1 y/o (49%). This may be explained by the affected children being brought by their parents to pediatricians rather than dermatologists even for skin concerns. In such instances, the adult caregivers may also show symptoms and signs of scabies, but were not tallied anymore as scabies cases, but just as close contacts.

Males having a higher frequency of scabies as shown in the pediatric inpatients seen in the PPS registry is similar to the trend in Cameroonian[40] and Indonesian boarding schools,[41] and a US dermatology practice.[42] This could be attributed to greater transmission among males from the higher physical activity and sweating in contact sports in men and rough play in boys compared to girls. On the other hand, the slightly higher percentage of females with scabies in the PDS registry may be due to the increased likelihood for women and girls to consult a dermatologist due to a skin problem, being more conscious of their appearance than men and boys.

The shift to a lower male:female ratio in 2015 is difficult to explain. There was a slight dip in the percentage of women in the labor force in the Philippines from 39.5% (2015) to 37.9% (2017) and with slow increase to 38.9% (2021), which may have resulted in reduced mobility of women allowing more time spent with their children, thereby possibly facilitating the transmission of scabies.[43]

The greatest number of cases in NCR based on PPS data in our study is compatible with overcrowding in urban areas as one of drivers of transmission of scabies. The NCR population density, is the most densely populated with 60x that of the national level. The 2nd highest number of cases from 2009 to 2013 was in Eastern Visayas, which is also endemic for soil-transmitted helminthiases (Leyte) and is the top region with poor sanitation.[44] The UNICEF has reported that sanitation targets in the Philippines, together with the rest of the world, are off-track from the goal to provide sanitation for all by 2030.[45] A recent typhoon in Southern Leyte required concerted efforts to restore access to clean water and sanitation facilities.[46] In a systematic review by Roswendi et al., it identified poor environmental sanitation, (lack of clean water, sewerage and garbage disposal), as factor for scabies mites to breed and spread widely.[47] In 2021, a joint effort by local prison authority, local government unit, a non-government organization, and the Philippine Dermatological Society to eradicate scabies showed more than half of inmates 396/688 (58%) were diagnosed with clinical or suspected scabies.[8]

Limitations of this study include potential under-reporting for both PDS (since 10/12 contributing institutions are in the NCR) and PPS (only inpatient cases were included). As scabies is also seen in other urban centers and resource-poor communities outside of the NCR, we may be missing these data. Surveillance for scabies in the resource-poor regions outside NCR where there is less healthcare access must be conducted. Rapid mapping in areas of reported outbreaks should be undertaken. Community surveillance must be prioritized over school-based programs since the most affected are the 1-month to 4-year-olds. Since the peaks are in the cooler months of the year, surveillance is best scheduled between November to January. The PDS and PPS can train primary care physicians and community health workers to recognize and treat scabies.

In addition, as scabies is more likely to be seen in the outpatient setting, the pediatric cases in this analysis only represent the hospitalized patients. Private clinic census data of dermatologists and pediatricians may also be surveyed if available to determine the true extent of the burden of disease. Information on outbreaks in communities that are served mostly by rural health centers may also be missed. Thus, there is a need to gather more data from other sources, such as government-run patient registries (e.g., PHIC), DOH epidemiology bureau surveillance data, and LGU reports, and a systematic review of published and unpublished epidemiologic studies. With the looming implementation of the Universal Health Care Act (Republic Act No. 11223), the burden of disease of scabies must be determined for budget planning and resource allocation for its prevention and control. An integrated approach to co-endemic NTDs, which includes scabies, should also be used to maximize resources and minimize cost. Cost effectiveness analysis and budget impact analysis must prioritize the age group between 1 month to 4 y/o where cases are most found.

CONCLUSION

Scabies was commonly seen in the younger age group (<5 y/o), slightly more in females in the PDS, while slightly more among males in the PPS, in the cooler months of the year, and in the urbanized NCR and Central/Eastern Visayas region. Since the PDS and PPS data may not be representative of the national situation, a comprehensive nationwide and community-based, rather than school-based surveillance, should target regions outside the NCR between November and January. There is a need to estimate the burden of disease in the Philippines to guide policy, practice, and future research.

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Statement of Authorship

RNFG contributed in the conceptualization of work, data collection and analysis, and writing of final manuscript. EQV contributed in the data collection and analysis, writing of final manuscript, and approval of final manuscript. VRCA contributed in the data collection and approval of final manuscript. MSFSC contributed in the conceptualization of work and final approval of the version to be published.

Author Disclosure

The authors do not have any declared conflicts of interest.

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APPENDICES

Table A1. Total Monthly Number of Scabies Cases Recorded in the PDS Registry from January 2010 to December 2021

Month	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
January	9	89	470	694	863	780	488	429	562	488	327	132
February	5	67	472	587	822	627	441	411	410	327	289	86
March	3	93	483	390	637	590	447	434	340	303	113	124
April	22	117	396	391	405	379	306	250	431	246	41	60
May	30	117	362	356	345	317	271	300	290	288	20	64
June	18	127	341	235	302	373	321	238	277	216	19	121
July	54	269	475	331	667	487	343	338	366	249	55	117
August	43	235	418	326	510	502	384	430	457	229	41	112
September	50	277	554	490	477	485	381	377	370	311	39	131
October	45	359	574	588	534	429	325	348	228	211	38	47
November	49	301	419	527	494	433	272	317	164	210	39	139
December	14	315	376	456	366	378	348	255	151	216	19	74
Total	342	2366	5340	5371	6422	5780	4327	4127	4046	3294	1040	1207

Table A2. Total Monthly Number of Scabies Cases Recorded in the PPS Registry from January 2009 to December 2021

Month	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
January	7	20	27	37	14	45	21	13	17	12	9	2	0
February	10	32	16	9	17	28	21	30	6	6	7	12	2
March	15	35	14	19	22	23	23	13	11	22	17	19	0
April	13	35	17	14	6	33	9	8	7	17	14	1	0
May	39	28	17	11	7	10	17	6	19	5	2	10	0
June	29	6	21	7	8	16	3	6	1	8	3	3	1
July	9	7	21	7	4	7	10	28	3	7	12	6	12
August	16	0	23	7	15	17	21	29	7	7	11	3	7
September	10	15	13	11	23	6	18	18	10	24	3	0	9
October	26	11	13	18	6	2	14	19	13	24	9	2	4
November	22	28	25	7	15	22	21	5	20	56	5	0	8
December	24	17	22	5	14	18	5	12	17	42	8	8	21
Total	220	234	229	152	151	227	183	187	131	230	100	66	64

Table A3. Total Annual Number (Percentage) of Scabies Cases among Pediatric Age Groups Recorded in the PDS and PPS Registry from 2009 to 2021

Year	<1 y		1-4 y		5-9 y		10-14 y		15-18 y	
	PDS	PPS	PDS	PPS	PDS	PPS	PDS	PPS	PDS	PPS
2009	–	148 (67.3%)	–	24 (10.9%)	–	25 (11.4%)	–	19 (8.6%)	–	4 (1.8%)
2010	20 (12.3%)	134 (58.8%)	54 (33.1%)	62 (27.2%)	37 (22.7%)	21 (9.2%)	28 (17.2%)	11 (4.8%)	24 (14.7%)	–
2011	115 (8.8%)	122 (53.3%)	587 (44.9%)	69 (30.1%)	288 (22.0%)	16 (7.0%)	204 (15.6%)	22 (9.6%)	114 (8.7%)	–
2012	348 (11.5%)	83 (54.6%)	1284 (42.3%)	40 (26.3%)	688 (22.7%)	18 (11.8%)	403 (13.3%)	7 (4.6%)	311 (10.3%)	4 (2.6%)
2013	331 (11.2%)	86 (57.0%)	1198 (40.4%)	51 (33.8%)	672 (22.6%)	7 (4.6%)	432 (14.6%)	4 (2.6%)	335 (11.3%)	3 (2.0%)
2014	321 (8.7%)	97 (43.3%)	1334 (36.2%)	58 (25.9%)	822 (22.3%)	45 (20.1%)	579 (15.7%)	24 (10.7%)	632 (17.1%)	–
2015	284 (9.4%)	75 (41.0%)	1092 (36.1%)	55 (30.1%)	808 (26.7%)	27 (14.8%)	504 (16.7%)	20 (10.9%)	338 (11.2%)	6 (3.3%)
2016	201 (9.2%)	107 (57.2%)	779 (35.6%)	56 (29.9%)	567 (25.9%)	12 (6.4%)	363 (16.6%)	9 (4.8%)	276 (12.6%)	3 (1.6%)
2017	152 (7.8%)	64 (48.9%)	655 (33.6%)	43 (32.8%)	513 (26.3%)	9 (6.9%)	363 (18.6%)	10 (7.6%)	265 (13.6%)	5 (3.8%)
2018	158 (8.9%)	67 (29.1%)	504 (28.3%)	104 (45.2%)	450 (25.3%)	50 (21.7%)	362 (20.3%)	9 (3.9%)	306 (17.2%)	–
2019	82 (5.6%)	48 (46.6%)	457 (31.2%)	27 (26.2%)	384 (26.2%)	9 (8.7%)	285 (19.5%)	16 (15.5%)	255 (17.4%)	3 (2.9%)
2020	24 (5.9%)	30 (44.8%)	130 (32.2%)	6 (9.0%)	115 (28.5%)	12 (17.9%)	66 (16.3%)	16 (23.9%)	69 (17.1%)	3 (4.5%)
2021	38 (7.9%)	28 (43.8%)	141 (29.3%)	8 (12.5%)	127 (26.4%)	11 (17.2%)	98 (20.4%)	16 (25.0%)	77 (16.0%)	1 (1.6%)
Total	2074	1089	8215	603	5471	262	3687	183	3002	32

Table A4. Total Annual Number (Percentage) of Scabies Cases among Adult Age Groups Recorded in the PDS and PPS Registry from 2010 to 2021

Year	19-24 y	25-29 y	30-34 y	35-39 y	40-44 y	45-49 y	50-54 y	55-59 y	60-64 y	65-69 y	70-74 y	≥75 y
2010	24 (14.5%)	11 (6.7%)	22 (13.3%)	12 (7.3%)	17 (10.3%)	20 (12.1%)	17 (10.3%)	16 (9.7%)	11 (6.7%)	7 (4.2%)	6 (3.6%)	2 (1.2%)
2011	238 (23.8%)	112 (11.2%)	108 (10.8%)	108 (10.8%)	78 (7.8%)	78 (7.8%)	74 (7.4%)	55 (5.5%)	61 (6.1%)	31 (3.1%)	33 (3.3%)	24 (2.4%)
2012	463 (22.2%)	277 (13.3%)	222 (10.7%)	189 (9.1%)	198 (9.5%)	183 (8.8%)	137 (6.6%)	114 (5.5%)	104 (5.0%)	73 (3.5%)	64 (3.1%)	60 (2.9%)
2013	505 (22.7%)	319 (14.3%)	260 (11.7%)	209 (9.4%)	184 (8.3%)	190 (8.5%)	141 (6.3%)	112 (5.0%)	102 (4.6%)	68 (3.1%)	65 (2.9%)	68 (3.1%)
2014	579 (22.8%)	344 (13.5%)	288 (11.3%)	255 (10.0%)	215 (8.4%)	203 (8.0%)	182 (7.2%)	122 (4.8%)	129 (5.1%)	104 (4.1%)	62 (2.4%)	62 (2.4%)
2015	587 (22.2%)	365 (13.8%)	281 (10.6%)	257 (9.7%)	265 (10.0%)	203 (7.7%)	188 (7.1%)	148 (5.6%)	118 (4.5%)	99 (3.7%)	57 (2.2%)	78 (2.9%)
2016	401 (20.0%)	292 (14.6%)	215 (10.7%)	178 (8.9%)	193 (9.6%)	184 (9.2%)	139 (6.9%)	121 (6.0%)	105 (5.2%)	86 (4.3%)	42 (2.1%)	50 (2.5%)
2017	407 (19.6%)	253 (12.2%)	201 (9.7%)	211 (10.2%)	219 (10.6%)	182 (8.8%)	161 (7.8%)	115 (5.5%)	130 (6.3%)	84 (4.0%)	56 (2.7%)	56 (2.7%)
2018	482 (22.1%)	248 (11.4%)	217 (9.9%)	205 (9.4%)	179 (8.2%)	185 (8.5%)	174 (8.0%)	147 (6.7%)	139 (6.4%)	80 (3.7%)	54 (2.5%)	72 (3.3%)
2019	370 (20.6%)	263 (14.6%)	190 (10.6%)	165 (9.2%)	173 (9.6%)	152 (8.5%)	123 (6.8%)	93 (5.2%)	124 (6.9%)	60 (3.3%)	44 (2.4%)	40 (2.2%)
2020	163 (26.7%)	84 (13.7%)	75 (12.3%)	50 (8.2%)	54 (8.8%)	56 (9.2%)	38 (6.2%)	25 (4.1%)	36 (5.9%)	10 (1.6%)	8 (1.3%)	12 (2.0%)
2021	173 (24.6%)	128 (18.2%)	81 (11.5%)	65 (9.2%)	53 (7.5%)	58 (8.2%)	34 (4.8%)	41 (5.8%)	30 (4.3%)	22 (3.1%)	8 (1.1%)	11 (1.6%)
Total	4392	2696	2160	1904	1828	1694	1408	1109	1089	724	499	535

Table A5. Total Annual Number of Scabies Cases according to Sex Recorded in the PDS and PPS Registries from 2009 to 2021

Year	Total		Male		Female		Sex ratio	
	PDS	PPS	PDS	PPS	PDS	PPS	PDS	PPS
2009		220		118		102		1.2
2010	328	234	169	151	159	83	1.1	1.8
2011	2308	229	1095	122	1213	107	0.9	1.1
2012	5104	152	2698	80	2406	72	1.1	1.1
2013	5193	151	2678	97	2515	54	1.1	1.8
2014	6233	227	3221	122	3012	105	1.1	1.2
2015	5672	183	2577	91	3095	92	0.8	1.0
2016	4192	187	1851	103	2341	84	0.8	1.2
2017	4022	131	1782	75	2240	56	0.8	1.3
2018	3962	230	1796	124	2166	106	0.8	1.2
2019	3262	100	1516	45	1746	55	0.9	0.8
2020	1015	66	454	41	561	25	0.8	1.6
2021	1185	64	514	43	671	21	0.8	2.0
Total	42476	2174	20351	1212	22125	962		

PDS, Philippine Dermatological Society. PPS, Philippine Pediatric Society

Table A6. Total Annual Frequency of Scabies Cases according to Diagnosis Recorded in the PPS Registry from 2009 to 2021

Year	Primary	Secondary	Tertiary
2009	92 (42%)	128 (58%)	0 (0%)
2010	94 (40%)	140 (60%)	0 (0%)
2011	91 (40%)	138 (60%)	0 (0%)
2012	70 (46%)	82 (54%)	0 (0%)
2013	69 (46%)	82 (54%)	0 (0%)
2014	105 (46%)	122 (54%)	0 (0%)
2015	79 (43%)	104 (57%)	0 (0%)
2016	79 (42%)	108 (58%)	0 (0%)
2017	67 (51%)	64 (49%)	0 (0%)
2018	156 (68%)	74 (32%)	0 (0%)
2019	52 (52%)	45 (45%)	3 (3%)
2020	34 (52%)	32 (48%)	0 (0%)
2021	24 (38%)	22 (34%)	18 (28%)
Total	1091	1223	21

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