Epidemiology Of Hyperhidrosis In The United States: A Systematic Literature Review

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INTRODUCTION

- Hyperhidrosis is a medical condition characterized by excessive sweating beyond what is physiologically required to maintain normal thermoregulation[1]
- Hyperhidrosis is classified as either primary or secondary
  - Primary hyperhidrosis is idiopathic and thought to result from hyperactivity of the sympathetic nervous system
    - It typically involves a specific body area (most often the underarms, palms, soles, or craniofacial regions), and the severity of symptoms can range from mild dampness to severe dripping [2, 3]
    - Data have suggested that a genetic component may be involved in some cases[4]
  - Secondary hyperhidrosis results from an underlying medical condition or use of prescription medications and implicates the entire body[2, 3]
- Hyperhidrosis has been shown to result in substantial impairment in health-related quality of life. This includes limitations in work and social relationships, physical and leisure activities, and impairments in emotional and mental health[5, 6]
- Epidemiological studies conducted in this population vary substantially in their methodology, and consequently, have yielded a wide range of prevalence estimates[3, 7]

OBJECTIVE

- This systematic literature review was conducted to assess the data currently available describing epidemiology (incidence, prevalence) of hyperhidrosis in the U.S and to summarize findings on the burden of hyperhidrosis

METHODS

- A systematic literature search was conducted using PubMed/MEDLINE and Scopus databases and applying PICOS criteria (Patient Population or Problem, Intervention, Comparison, Outcomes, and Setting) to define the scope of the search[8]
- Study inclusion criteria:
  - Reports of primary sources of epidemiologic data (incidence, prevalence) from patients in the U.S. with self-reported or diagnosed hyperhidrosis
  - Scope of search was defined with PICOS:
    - population (patient-reported or diagnosed hyperhidrosis patients)
    - outcomes measurement (incidence, prevalence)
    - study type (observational study)
    - study countries or regions (U.S.)
  - Published in 2000 or later
  - English language
- Search conducted on January 7, 2018 with terms as described in **Table 1**

Table 1. Specific Search Terms Utilized in PubMed and Scopus

PubMed	Scopus
(((“hyperhidrosis”[MeSH Terms] OR “hyperhidrosis”[All Fields]) AND (“epidemiology”[Subheading] OR “epidemiology”[All Fields] OR “epidemiology”[MeSH Terms]) OR (“epidemiology”[Subheading] OR “epidemiology”[All Fields] OR “incidence”[All Fields] OR “incidence”[MeSH Terms]) OR (“epidemiology”[Subheading] OR “epidemiology”[All Fields] OR “prevalence”[All Fields] OR “prevalence”[MeSH Terms])) AND (“2000/01/01”[PDAT] : “3000”[PDAT]))	((TITLE-ABS KEY (*hyperhidrosis*) AND TITLE-ABS KEY (*epidemiology* OR *incidence* OR *prevalence*)) ND PUBYEAR > *1999*)

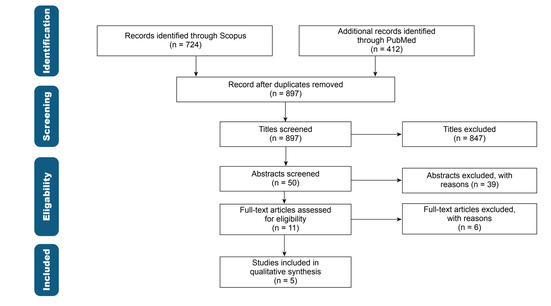
- Epidemiological data are summarized; other study outcomes such as population characteristics and burden of disease are reported narratively

RESULTS

Citation Screening

- The search yielded 897 articles eligible for title screening: 50 were retained for abstract review, of which 11 required full text review against PICOS criteria (**Figure 1**)
- Reasons for exclusion are summarized in **Table 2**

Figure 1. Systematic Literature Search Results: PRISMA Flow Diagram



PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Table 2. Reasons for Exclusion

	Eliminated at Title Stage	Eliminated at Abstract Stage	Eliminated at Full Text Stage
Population	547	8	0
Outcome	256	15	1
Study Type	18	10	5
Language or Region	26	6	0
Total	**847**	**39**	**6**

Note: Studies could have been excluded due to multiple reasons; exclusion criteria were applied in the order they appear in the table

Study Characteristics and Findings: Epidemiology

- Five studies met all inclusion criteria, 3 of which were conducted in samples considered representative of the U.S. population, and the remaining 2 in sub-populations (children and lower-limb amputees; **Table 3**)
- Overall prevalence of hyperhidrosis as defined in each respective study was higher among the 3 studies utilizing self-reported lifetime prevalence (2.8% and 4.8% estimated in overall U.S. population and 66% observed in lower-limb amputees) compared with the 2 studies requiring a physician diagnosis or documentation of treatment received for hyperhidrosis (0.10% observed in children within study population and 0.35% 1-year prevalence; **Table 3**)

Table 3. Study Summaries

	Doolittle et al 2016[3]	Hansen et al 2015[9]	Mirmirani and Carpenter 2014[10]	Ricchetti-Masterson et al 2017[7]	Strutton et al 2004[11]
Patients	N=8160 (no age restriction; specific age range not provided in publication)	N=140 (age range 23-87; 69% male)	N=248,775 children and adolescents stratified by weight	N=37,919 million in U.S. (2011); N=37,937 million in U.S. (2012); N=33,117 million in U.S. (2013); no age restriction; specific age range or age-specific data not provided	N=3.897 million males and N=3.862 million females of any age
Setting	Online survey in nationally representative sample (balanced to meet U.S. census parameters); authors do not specify primary vs secondary HH	Survey in patients with lower-limb amputation using prosthetics recruited from two U.S. amputee clinics (likely secondary HH due to prosthesis)	Retrospective study of health care database records in Northern California, U.S. (2009 Index date); authors do not specify primary vs secondary HH	Retrospective study of health care database records from the U.S. and U.K. (2011-2013); reflects primary HH but authors note that some cases of secondary HH are likely included	Consumer survey in 150,000 U.S. households (primary HH)
Prevalence, Incidence, or Frequency reported	Self-reported: 4.8% estimated prevalence in U.S. overall (2.1% and 5.6% in those aged <18 years and ≥18 years, respectively)	HDSS score of 3 or 4: 12.6% frequency observed within study population HDSS score of at least 2: 66%	Physician diagnosed: 0.10% frequency observed within study population (1-year period)	Physician diagnosed AND/OR HH treatment received: 0.35% prevalence for 1-year period; 1.03% lifetime prevalence in U.S. (estimated)	Self-reported: 2.8% prevalence in U.S. (estimated); 1.4% prevalence for axillary HH
Key Findings on Burden of HH	70% with an HDSS score of 3 or 4 in at least one body area	12.6% reporting HDSS of 3 or 4: • 5.9% reporting HDSS of 4 • 6.7% reporting HDSS of 3 • 54.6% reporting HDSS of 2	Not specifically evaluated	Not specifically evaluated	21.6% reporting HDSS of 3; 10.8% reporting HDSS of 4
Other Findings of Note	Underarms identified as most common area for HH; 65% of those with HH experienced excessive underarm sweating (either alone or in combination with another area)	Younger age was predictive of more severe sweating; significant correlations between sweating burden and prosthetic fit and function were noted	HH rates similar across weight groups	Incidence and prevalence rates among women consistently higher than men	Underarms identified as most common area for HH; slightly more than half (50.8%) of those with HH experienced excessive underarm sweating (either alone or in combination with another area)

The HDSS is a diagnostic tool that asks patients to rank the severity of their hyperhidrosis. Responses range from 1-4, with higher scales indicating greater symptom severity and interference with daily activities. A score of 3 indicates “barely tolerable sweating and frequent interference,” A score of 4 indicates “intolerable sweating and always interferes”
HH, hyperhidrosis; HDSS, Hyperhidrosis Disease Severity Scale

- Prevalence was stratified by age in two studies (**Table 4**),[3, 11] with rates higher in patients aged 18-54 than <18 or ≥65

Table 4. Impact of Age on Self-Reported Hyperhidrosis Prevalence[a]

	U.S. Prevalence (%)	
	Doolittle 2016[3]	**Strutton 2004[11]**
All	4.8	1.4
Age group (y)		
<18	2.1	
0-5		0.1
6-11		0.3
12-17		1.2
18-64	5.6	
18-39	8.8	
18-24		2.0
25-34		2.6
40-64	4.2	
35-44		2.0
45-54		1.8
55-64		1.3
≥65	2.1	0.6

[a]A direct comparison between prevalence rates reported here is limited by differences in study design

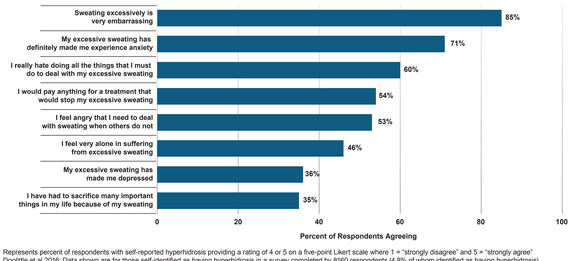
- A recent abstract (not identified in the current screen) evaluated hyperhidrosis prevalence among 981 U.S. teens (age 12 to 17 years) via an online survey; in this study 17.1% of teens reported excessive, uncontrollable sweating based on published diagnostic criteria, which is notably higher than previous reports in the same age group[12]
- Important methodological differences include the variation in study design (retrospective claims databases compared with online surveys), and how a diagnosis of hyperhidrosis was confirmed (HDSS [Hyperhidrosis Disease Severity Scale] score cut-off, self-report, physician-diagnosed, or a hybrid where patients receiving treatment associated with hyperhidrosis documented in a claims database were included even if a corresponding physician diagnosis was lacking)

Study Characteristics and Findings: Clinical Presentation and Burden of Hyperhidrosis

- Results stratified by body area were reported in two of the studies (Doolittle et al and Strutton et al), with the axillary (underarm) region being the most commonly affected (51%–65%)[3, 11]
- Both Doolittle et al and Strutton et al employed surveys that included HDSS scoring methods to assess the severity of hyperhidrosis
  - Relative proportions of hyperhidrosis patients experiencing HDSS scores of 3 (barely tolerable, frequently interferes) or 4 (intolerable, always interferes) are notably lower in Strutton et al (10.8% and 21.6% for HDSS 3 and 4, respectively) compared with Doolittle et al (70% with HDSS of 3 or 4), though the underlying cause for this discrepancy is unknown and both surveys indicate a substantial burden among those suffering from hyperhidrosis
- The Doolittle et al study provided a further breakdown of occurrence and sweating severity by body area:
  - Other frequent areas of sweating included craniofacial (42%), palmar (hands; 40%), and plantar (feet; 38%)
  - Interestingly, the two areas associated with the highest percentage of patients reporting a HDSS score of 3 or 4 were palmar sweating (54% of patients with hand sweating rated it as HDSS of 3 or 4) and axillary sweating (52% of patients with axillary sweating rated it was associated with an HDSS score of 3 or 4)
- In order to better characterize hyperhidrosis burden, these same two surveys asked patients to rate impact among various components of daily life
  - The respective surveys focus on different impact areas associated with hyperhidrosis, complicating direct comparisons; however, both surveys show a negative impact across a broad set of components of daily life (**Figure 2A and 2B**)

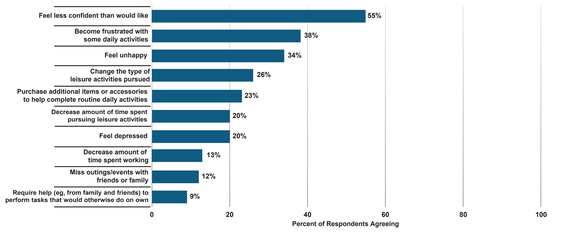
Figure 2. Impact of Hyperhidrosis on Components of Daily Life

2A. Respondents with Self-Reported Hyperhidrosis (Doolittle et al 2016)



Represents percent of respondents with self-reported hyperhidrosis providing a rating of 4 or 5 on a five-point Likert scale where 1 = “strongly disagree” and 5 = “strongly agree” Doolittle et al 2016; Data shown are for those self-identified as having hyperhidrosis in a survey completed by 8160 respondents (4.8% of whom identified as having hyperhidrosis)

2B. Respondents with Self-Reported Axillary Hyperhidrosis (Strutton et al 2004)



Represents percent of overall self-reported axillary hyperhidrosis respondents agreeing to the statements above. Survey items adapted from the Hyperhidrosis Impact Questionnaire ©. Strutton et al 2004; Data shown are for those self-identified as having hyperhidrosis in a survey completed by 103,500 U.S. households

- Despite the level of burden associated with hyperhidrosis, it is notable that many patients had not discussed their sweating with a health care professional (HCP)
  - The proportion ranged from 38%[3] to 51%[11] of the populations studied, but notable differences were observed based upon intrinsic patient factors with consistent results between the studies
  - Discussions with HCPs were much more common when the patient was younger (<21 years old)[3, 11] and more likely to occur when the patient was a woman (28.6% of males vs 47.5% of females discussing their sweating with HCPs)[11]
  - Those asked about possible interventions for sweating felt that most interventions were not helpful or only mildly helpful[3]
- The proportion of those reporting the highest levels of hyperhidrosis severity (as assessed by the HDSS) among lower-limb amputees using prosthetics[9] was lower than that observed in the other studies included here. Even so, heat and sweating have been identified as the most frequent amputee problem leading to reduced quality of life and there is a lack of guidance for clinical management of sweating among limb amputees

LIMITATIONS AND CONCLUSIONS

- Direct comparisons among prevalence rates summarized here are difficult due to variations across studies (design, sample, method of hyperhidrosis diagnosis)
- Ex-US studies were not included, although the initial literature search revealed what appeared to be some epidemiological data collected outside of the US in hyperhidrosis, so future qualitative assessments can be expanded to include these studies
- Abstracts/congress posters were not included with the search parameters, which eliminated the abstract discussed above,[12] though it is encouraging to see ongoing research with respect to hyperhidrosis prevalence being conducted
- A relatively small number of epidemiological studies of hyperhidrosis have been conducted, despite this being a disease area with substantial patient burden and limited treatment options
- Patient-reported prevalence is substantially higher than diagnosed prevalence
- Awareness of epidemiologic features of hyperhidrosis may help increase awareness and facilitate early diagnosis
- Additional research is warranted, including in specialized patient groups, to further understand prevalence of hyperhidrosis, to increase health care provider awareness of this condition, and to gain a better understanding of patient perspectives and preferences related to disease management

References

1. Stolman LP. Treatment of hyperhidrosis. *Dermatol Clin.* 1998; 16: 863-9.
2. Solish N, Bertucci V, Dansereau A, et al. A comprehensive approach to the recognition, diagnosis, and severity-based treatment of focal hyperhidrosis: recommendations of the Canadian Hyperhidrosis Advisory Committee. *Dermatol Surg.* 2007; 33: 908-23.
3. Doolittle J, Walker P, Mills T, et al. Hyperhidrosis: an update on prevalence and severity in the United States. *Arch Dermatol Res.* 2016; 308: 743-49.
4. Hashmonai M, Cameron AEP, Connery CP, et al. The Etiology of Primary Hyperhidrosis: A Systematic Review. *Clin Auton Res.* 2017; 27: 379-83.
5. Cina CS, Clase CM. The Illness Intrusiveness Rating Scale: a measure of severity in individuals with hyperhidrosis. *Qual Life Res.* 1999; 8: 693-8.
6. Glaser DA, Hebert A, Peretti L, et al. Understanding Patient Experience With Hyperhidrosis: A National Survey of 1,985 Patients. *J Drugs Dermatol.* 2018; 17: 392-96.
7. Ricchetti-Masterson K, Symons JM, Aldridge M, et al. Epidemiology of hyperhidrosis in 2 population-based health care databases. *J Am Acad Dermatol.* 2018; 78: 358-62.
8. Methley AM, Campbell S, Chew-Graham C, et al. PICO, PICOS and SPIDER: a comparison study of specificity and sensitivity in three search tools for qualitative systematic reviews. BMC *Health Serv Res.* 2014; 14: 579.
9. Hansen C, Godfrey B, Wixom J, et al. Incidence, severity, and impact of hyperhidrosis in people with lower-limb amputation. *J Rehabil Res Dev.* 2015; 52: 31-40.
10. Mirmirani P, Carpenter DM. Skin disorders associated with obesity in children and adolescents: a population-based study. *Pediatr Dermatol.* 2014; 31: 183-90.
11. Strutton DR, Kowalski JW, Glaser DA, et al. US prevalence of hyperhidrosis and impact on individuals with axillary hyperhidrosis: results from a national survey. *J Am Acad Dermatol.* 2004; 51: 241-8.
12. Hebert A, Glaser DA, Ballard A, et al. Prevalence of primary focal hyperhidrosis (PFHh) among teens 12-17 in US Population. In: Hebert A, ed., 75th Annual Meeting of the American Academy of Dermatology. Orlando, FL, 2017.

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Disclosures

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