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Job hazards and respiratory symptoms in Hispanic female domestic cleaners

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ABSTRACT

The occupational hazards and respiratory symptoms of domestic cleaners in USA are largely unknown. We conducted a cross-sectional study among 56 Hispanic female domestic cleaner on their health status and frequency of cleaning products used and tasks performed. While women used multi-use products (60.0%) and toilet bowl cleaners (51.8%) most days of the week, many (39.3%) reported not using personal protective equipment while cleaning. Itchy/watery eyes (61.8%) and itchy nose (56.4%) were the most frequently reported symptoms. A history of physician-diagnosed asthma was reported by 14.3% while 33.9% had symptoms of bronchial hyperresponsiveness (BHR). In conclusion, this vulnerable population has high prevalence of physician-diagnosis asthma and BHR symptoms and is potentially exposed to myriad occupational hazards. Further research exploring associations between products use, cleaning tasks and respiratory symptoms is warranted.

KEYWORDS

Asthma; domestic cleaners; Hispanic; occupational health; vulnerable workers

Introduction

Nearly 1 million workers in USA were employed as maids or housekeeping cleaners in 2017.[1] Compared to cleaners in industrial or commercial settings, domestic cleaners are often employed on an informal basis, do not receive formal training, are more exposed to respiratory irritants and sensitizers, and more frequently report respiratory symptoms.[2] Domestic cleaners represent an understudied and overburdened population meriting a closer examination of potentially hazardous occupational and environmental exposures.

Methods

We conducted a cross-sectional study of women working in the previous 12 months as informal self-employed domestic cleaners in San Antonio, Texas, in collaboration with Domésticas Unidas (DU), a local grassroots organization. The University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects approved the study. Fifty-six participants were recruited primarily at DU and community events.

We administered a brief survey to collect: age, ethnicity, education, income, years lived in USA, smoking, chronic health conditions, physician-diagnosed asthma, rashes/irritated skin after cleaning, and respiratory symptoms. According to our previous work[3], the following symptoms were combined into a single metric of bronchial hyper-responsive (BHR) symptoms: ever had trouble breathing; wheezing in the last 12 months; shortness of breath in the last 12 months; awakened in the night by cough/chest tightness in the last 12 months; itchy/watery eyes or feelings of tightness in the chest when near animals/feathers/dust; and itchy/watery eyes when near trees/grass/flowers. We classified women as atopic if they responded positively to any of the following in the past 12 months: itchy/watery eyes when near animals/feathers/dust; chest tightness when near animals/feathers/dust; and itchy/watery eyes when near trees,

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Table 1. Self-reported respiratory symptoms among women working as domestic cleaners in San Antonio, Texas, 2017.

	n	%
Ever had trouble breathing in their life	13	23.2
Continuously[a]	3	23.1
Repeatedly[a]	10	76.9
Breathing trouble brought on by work environment[a]	8	61.5
In the past 12 months had:		
Wheezing or whistling in chest	10	17.9
Shortness of breath	15	26.8
Watery, runny nose	28	50.9
Blocked nose	25	46.3
Itchy nose	31	56.4
Sneezing	27	49.1
Watery, itchy eyes	34	61.8
Awakened by attack/episode from chest tightness	9	16.1
Atopy	40	71.4
Physician-diagnosed asthma	8	14.3
Bronchial hyperresponsive-symptoms (BHR)	19	33.9

[a]Calculated as proportion among 13 women who 'Ever had trouble breathing in their life'.

grass, flowers or pollen.[3] We also collected the frequency (never, <1 day/week, 1–3 days/week, 4–7 days/week) of cleaning tasks (i.e., dusting or sweeping, mopping, polishing, cleaning the toilet bowl, oven, windows or mirrors, and general bathroom or kitchen cleaning) and products used at work (i.e., general cleaning products: washing powders, liquid multi-use products, polishes/waxes, bleach, ammonia, decalcifiers, acids, solvents/stain removers, toilet bowl cleaner, scented products; and cleaning sprays: for cleaning furniture, glass, carpets, ovens, or tile, or for mopping, degreasing, ironing, or air freshening).

We conducted exploratory logistic regression analyses to estimate the association between frequency of cleaning tasks/products used and BHR-related symptoms but not with asthma given its low prevalence. We collapsed responses for each cleaning task/product into exposed or unexposed. For most variables, we considered "4–7 days a week" as exposed and all others as unexposed. For tasks/products for which <25% of women responded with "4–7 days a week" (i.e., waxing, oven cleaning, waxing products, ammonia, acids, solvents, or the use of rug cleaning, oven cleaning, degreasing, or ironing sprays), we grouped "4–7 days a week" and "1–3 days a week" in the exposed group. Given the small sample and the exploratory nature of our analyses, we only adjusted the models for age (as a continuous variable) and ever smoking (yes/no), using SAS version 9.4 (SAS Inc., Cary, NC).

Results

Participants were 23–74 years of age, with most being >50 years (57.1%). Almost all self-identified as Hispanic (96.4%); 71.4% had a high school or < high school education, and 57.1% had an annual income ≤$15,000. About one-quarter ever smoked (25.9%). Half (48.2%) worked on average 20–39 h per week, although, only one-third (32.1%) worked all of these hours as a cleaner. More than one-third had high blood pressure (38.2%) and nearly 43% percent reported ever having a skin rash/irritated skin during/after completing cleaning tasks. The majority reported joint pain in the previous 12 months (78.6%).

Many participants noted upper respiratory symptoms in the previous 12 months (Table 1). Among the 13 women who reported ever having breathing trouble, 61.5% attributed it to their work environment. Most (71.4%) women were classified as atopic, 14.3% reported a physician-diagnosis of asthma, and 33.9% had BHR-related symptoms. Most participants reported dusting/sweeping/vacuuming (58.9%), mopping (62.5%), cleaning the toilet bowl (62.5%), general bathroom (62.5%), and kitchen (57.1%) cleaning on most days per week. The most frequently used cleaning products were liquid multi-use products, toilet bowl cleaners, perfumed/scented cleaning products and bleach; 60, 51.8, 50, and 44.6% of women reported using these products 4–7 days/week, respectively. Many reported 'always' (48.2%) or 'sometimes' (32.1%) mixing cleaning products with water before use. And 39.3% said they did not use PPE (e.g., gloves or masks) while cleaning. About two-thirds (67.9%) never used organic, natural, or ecofriendly cleaning products.

With few exceptions, results from the exploratory logistic regression (Table 2) suggest positive associations between exposure to cleaning tasks or products and BHR-related symptoms, although estimates were imprecise. Odds ratios for the use of ammonia

Table 2. Associationa of cleaning tasks and products use and BHR-related symptoms among women working as domestic cleaners in San Antonio, Texas, 2017.

	% Exposedb	Odds ratio (95% confidence interval)
Cleaning tasks		
Dusting	61.1	2.5 (0.7, 8.9)
Mopping	64.8	2.9 (0.75, 11.6)
Waxing	29.6	1.2 (0.3, 4.2)
Cleaning the toilet bowl	64.8	3.1 (0.9, 12.9)
General bathroom cleaning	64.8	2.0 (0.5, 7.3)
Cleaning the oven	38.9	1.5 (0.4, 5.1)
General kitchen cleaning	59.3	1.8 (0.5, 6.1)
Cleaning windows	39.6	1.1 (0.3, 3.5)
Use of cleaning products		
Washing detergents	25.9	0.8 (0.2, 3.1)
Multi-use products	62.3	2.2 (0.6, 8.0)
Waxing products	59.3	1.5 (0.4, 5.0)
Bleach	46.3	1.8 (0.6, 5.9)
Ammonia	20.8	7.5 (1.6, 35.9)
Acids	20.8	1.9 (0.5, 7.9)
Solvents	40.7	4.5 (1.3, 15.9)
Toilet-bowl cleaners	54.7	2.9 (0.8, 10.8)
Scented cleaning products	50.0	1.5 (0.5, 5.1)
Use of cleaning sprays for		
Cleaning furniture	29.6	0.5 (0.1, 2.1)
Cleaning glass	44.4	0.8 (0.3, 2.7)
Cleaning rugs or carpet	18.5	2.1 (0.5, 10.5)
Mopping floors	34.0	0.5 (0.1, 1.75)
Cleaning tile	33.3	1.0 (0.3, 3.3)
Cleaning the oven	22.2	2.1 (0.5, 8.1)
Degreasing	33.3	2.0 (0.6, 7.0)
Ironing clothes	13.0	0.3 (0.03, 2.4)
Air freshening	33.3	4.6 (1.3, 16.5)

[a]Adjusted for age and ever smoking (excluding two participants who did not provide data on smoking).
[b]Responses for each cleaning task/product were collapsed into exposed or unexposed. See details in the 'Methods' section. .

(OR = 7.5; 95% CI = 1.6, 35.9), solvents (OR = 4.5; 95% CI = 1.3, 15.9) and cleaning the toilet (OR = 3.1, 95% CI = 0.9, 12.9) were among the most elevated. Results were more mixed regarding associations between cleaning sprays and BHR-related symptoms. We observed a statistically significant, albeit imprecise, association between use of air freshening sprays and BHR-related symptoms (OR = 4.6; 95% CI = 1.3, 16.5).

Discussion

We provide an initial characterization of a hard-to-reach, vulnerable population of women working as domestic cleaners in USA and evidence that these women have a high prevalence of upper respiratory symptoms, including physician-diagnosis of asthma and BHR-related symptoms. Several studies have reported adverse respiratory outcomes among cleaners,[4–6] though prior work focused on professionally employed cleaners in Europe.[7–9] However, informal domestic cleaners may be at heightened risk of exposure to hazardous substances as they may lack appropriate training and be more likely to misuse or mishandle chemicals or use proper PPE.[2] As in prior research,[10] women in our study reported infrequent use of PPE. This combined with their frequent use of potentially toxic cleaning products (e.g., bleach, toilet bowl cleaners) suggests that these women are practicing potentially unsafe work-related behaviors.

There is consistent evidence of a positive association between occupation as a cleaner and respiratory disorders, including asthma, reduced lung function, and bronchial hyperresponsiveness.[3,6,8,11–20] The majority of this evidence comes from studies of professional/industrial cleaners with little evidence among the more vulnerable group of domestic cleaners. However, a series of focus groups found that domestic cleaners report more adverse respiratory symptoms and are at increased risk for exposure to respiratory irritants compared with industrial cleaners.[3] Statistically significant associations between cleaning the kitchen and toilet bowl and using bleach with lower respiratory symptoms was found among formal and informal domestic cleaners in Spain.[21] In our study, lower respiratory tract symptoms were

associated with the use of bleach (OR 3.5); the odds were greater when the use of diluted bleach was considered (OR 4.4), potentially indicating risk associated with mixing chemicals with water, an act commonly reported in our population.

In our study, though based on only a few women, the prevalence of physician-diagnosed asthma (14.3%) was higher than the asthma prevalence from the 2016 National Health Interview Survey for US adult Hispanic females (12.1%).[22] It was also higher compared to other studies of cleaning workers,[23–25] possibly suggesting greater exposure to asthmagens among domestic cleaners. An even greater proportion of women (33.9%) reported BHR-related symptoms. We also found a high prevalence of atopy. This may reflect a scale limitation, which was validated in a group of health care workers that did not include cleaners.[3] The symptoms addressed in the scale (e.g., itchy/watery eyes) could also be caused by airborne irritants, not sensitizers. Our sample had a high prevalence of exposure to cleaning products with irritant properties. Therefore, it would not be surprising if some of the irritant eye symptoms was not distinguishable from an allergic response.

Given the cross-sectional and descriptive nature of this study, causality cannot be inferred. Nonetheless, our results suggest the presence of risky behaviors (e.g., mixing chemicals, lack of PPE use), potential exposure to toxic chemicals, and elevated prevalence of respiratory symptoms. Our analysis is also suggestive of positive associations between some cleaning tasks/products and BHR-related symptoms. Recall bias is possible since our survey required women to recall average weekly frequency of tasks completed and products used as well as symptom presence in the 12 months prior to survey completion. Thus, non-differential misclassification of exposure and outcome is possible.[2,26] Consistent with previous studies, our findings indicate the need for a more comprehensive assessment of respiratory outcomes associated with occupational exposures to cleaning agents.[5,27] Needed next steps include a comprehensive exposure assessment to characterize specific exposures in the workplace as well as in women's home and neighborhood environments and epidemiologic analyses relating occupational exposures with respiratory outcomes among this population. Future studies should also consider both frequency and intensity of exposure based on cleaning tasks completed, duration of potential exposure, and other workplace behaviors that may affect susceptibility.[28] Ultimately, a more complete understanding of such factors will inform the development of prevention and intervention efforts aimed at reducing potentially harmful exposures.

Key messages

1. **What is already known about this subject?**
   Compared with other occupations, domestic cleaning is associated with at higher risk for respiratory problems, including asthma. Much of the prior literature comes from professionally employed cleaners in Europe and there is little information on both informal domestic cleaners and other places.
2. **What are the new findings?**
   We provide evidence of the use of potentially toxic cleaning agents and a high prevalence of upper respiratory symptoms, including physician-diagnosis of asthma and bronchial hyper-responsiveness symptoms, among a group of informal domestic female cleaners in USA.
3. **How might this impact on policy or clinical practice in the foreseeable future?**
   Informal workers are generally excluded from social protections and have less than optimal access to medical care, which hinders the diagnosis of preventable and treatable problems.

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The study protocol was approved by The University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects. Survey completion implied consent in which all participants were verbally informed of their ability to withhold responses, terminate participation, and provided staff contact information should they have any questions or concerns about the study.

Disclosure statement

No potential conflict of interest was reported by the authors.

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