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Occupational Asthmagens in Cleaners: A Focus Group Study

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LIST OF ABBREVIATIONS

OAC - Occupational Asthma among Cleaners

NIOSH – National Institute for Occupational Safety and Health

NHANES – National Health and Nutrition Examination Survey

ABSTRACT

Background: Despite being a large part of the workforce, cleaners remained a relatively understudied occupational group in the U.S.

Methods: Twelve focus group sessions were conducted in Lubbock, TX, and Houston, TX. Participants were asked about their job tasks, type of products they use to clean, job training, and work environment.

Results: A total of 99 domestic and industrial cleaners participated in the focus group sessions. Three general themes emerged regarding cleaning professionals' work experiences: a) job training; b) chemical exposure and use; and c) competence. Domestic cleaners demonstrated significant skills deficit among across each of these three themes as compared to industrial cleaners. Domestic cleaners reported more frequent exposure to respiratory irritants and sensitizers and also reported adverse respiratory symptoms as compared to industrial cleaners.

Conclusions: This qualitative study suggests that domestic cleaners may be at increased risk of exposures that may have potential adverse respiratory health effects.

HIGHLIGHTS/SIGNIFICANT FINDINGS

Several important differences in terms of occupational exposures to potential asthmagens, job tasks, and training were observed between domestic and industrial professional cleaners in this qualitative study

Typically, respondents working in domestic settings reported receiving no training or merely informal training. In most cases, these participants reported that their training occurred on-the-job provided by a partner who in most cases was a relative or friend. The majority of domestic cleaners described their training as not instructive, but as being trained through trial and error.

In contrast, industrial cleaners reported receiving a variety of levels of formal training such as examinations, inspections of surfaces and rooms, as well as being partnered with an experienced co-worker before given individual responsibilities. Although these participants described their training as thorough, they also described having to cut corners and frequently violating organization policy in order to do their jobs. For example, they expressed concern over the quality of equipment and clothing provided to them. The most common complaint among these industrial employees was poorly fitting protective clothing. Several reported that protective suits and shoes were made to fit most people, yet most described a poor fit for themselves. In fact, many felt that wearing poorly fitting protective clothing posed a greater risk of exposure than if they wore their own clothes. Additionally, many reported that protective clothing tended to be in short supply. Domestic cleaners did not describe concerns or problems with protective clothing or equipment primarily because this was not provided to them. The majority of them reported wearing old clothes during work.

Many domestic cleaners reported relying on the advice of others regarding chemical use. These participants reported being given an area to clean using whatever the household provided. In most cases, domestic cleaners reported experiencing more physical symptoms during and following a day of cleaning than industrial cleaners. More adverse respiratory symptoms including congestion, coughing, nausea, and trouble breathing were reported by domestic cleaners as compared to the industrial cleaners. Reports of eye irritation were also common among domestic cleaners. Other frequently reported symptoms included allergies, headache, and body aches. The increased burden of respiratory and musculoskeletal symptoms experienced by domestic professional cleaners could in part be due to lack of training in skills among them.

In most cases, industrial cleaners displayed moderate to high levels of knowledge about their jobs. Most industrial cleaners remarked that each employee has a specific job he or she is assigned. An employee's assignment was given based on his/her specific job skill. Furthermore, these participants indicated that having a cleaning routine contributed to their efficiency and job safety. In contrast, the competence displayed by the participants during the interviews with domestic cleaners varied significantly. Many do not consider exposure to their bodies as cleaning-related risks (although many reported experiencing physical symptoms during and following cleaning). Additionally, many domestic cleaners displayed little knowledge of which cleaning products were most appropriate for particular surfaces and tasks.

Some of the barriers identified by domestic cleaners included language barriers (Hispanic participants); trust issues- although no questions related to legal status were asked, several participants brought with them legal documents; and lack of proper training. Proximity of interview place was cited as one of the major reason for attending the session. The most effective approached identified for recruitment were word of mouth (37%), flyers/brochure (29%) and newspaper ads (34%).

TRANSLATION OF FINDINGS

The findings from our study identified workplace practices and potential respiratory irritants and sensitizers at workplaces that may pose health hazards to professional cleaners. Although the study was primarily qualitative and the results may need to be validated in future studies using more rigorous quantitative research designs, nevertheless this study adds several important information to the scant body of literature. First, professional cleaners were found to use multiple products during their cleaning tasks. These include disinfectants, general purpose cleaners, carpet cleaners, glass cleaners and bathroom cleaners. Many of the active components found in these cleaning agents are established respiratory tract irritants or sensitizers. Proper handling of these chemicals, including use of personal protective gears, could help minimize exposure to these asthmagens. Second, several professional cleaners, especially domestic cleaners, complained of respiratory and musculoskeletal symptoms during and following cleaning tasks. The results from this study could be used in future studies to devise educational and training interventions to reduce adverse impact of these cleaning tasks on workers' health.

OUTCOMES/RELEVANCE/IMPACT

Cleaners form a large part of the workforce in the U.S., employing more than 3 million people in this occupation [U.S. Department of Labor, 2006]. Working as a professional cleaner presents an opportunity for exposure to several respiratory irritants and sensitizers as well as ergonomics and musculoskeletal problems, and our findings indicate that the contribution of these occupational exposures to health effects, especially among domestic cleaners, is not likely to be trivial.

SCIENTIFIC REPORT

BACKGROUND

Despite the fact that a large part of U.S. workforce employs in cleaning related occupations, the potential adverse respiratory health effects of work-related exposure to cleaning agents have not been widely recognized.

In a community-based case-control study, conducted in Singapore, an almost two-fold increased risk of asthma was found among cleaners (OR=1.91, 95% CI 1.22-2.99) [Ng et al., 1994]. Whereas, in a registry-based mortality study, performed in England and Wales, high death rates from lung cancer and other respiratory diseases were reported among cleaners [Moser et al., 1991]. Recently, a high prevalence of occupational asthma (29%) was observed among female janitors, housekeepers, and cleaners in Sao Paulo [Medina-Ramon et al., 2003]. Occupational asthma among cleaners comprised 12% of all cases; cleaning agents were the most frequently reported exposure agents cited by females, comprising 20% of all agents mentioned.

In the U.S., relatively few studies have addressed the topic of asthma and cleaners. However, those that have done so have identified this occupational group as an at-risk group, consistent with studies from Europe and elsewhere. Based on Doctor's First Report (DFR) data, the annual rate for work-related asthma was found to be highest among janitors and cleaners (625/ million workers) in California [Reinisch et al., 2001]. More recently, based on NHANES III data, a four-fold increased risk of work-related wheezing (OR=4.1 95%CI 1.4-12.1) in the lodging industry was reported [Arif et al., 2002], where the exposures of concern are often related to cleaning substances. Similarly, cleaners were found to have a more than two-fold increased risk of work-related asthma (OR=2.37 95%CI=0.53-10.58) and a more than five fold increased risk of work-related wheezing (OR=5.44 95%CI=2.43-12.18) in the U.S. [Arif et al.,

2003]. In a preview of its 2002 report on work-related lung disease surveillance report, NIOSH indicated that cleaning agents were the second most common materials associated with SENSOR-based reports of work-related asthma [Attfield et al., 2003].

Study Objectives

The specific aims were:

1. To identify an appropriate population of domestic and industrial cleaners, both English and non-English speaking.
2. To determine the feasibility of contacting and tracking representative groups of domestic and industrial cleaners, for use in future studies of asthma in this worker group.
3. To characterize occupational exposures among domestic and industrial cleaners.
4. To develop and pilot test an English and Spanish version of a survey instrument for use in future studies of asthma among domestic and industrial cleaners.
5. To use information obtained from the focus groups to develop a preliminary industry-specific JEM and a job-specific exposure questionnaire that could be used in future studies of asthma in this worker group.

All of the aims were achieved.

Procedures and Methods

The first year of the grant was devoted to planning sample recruitment methodologies and focus group protocol. Project personnel, including a project coordinator, were hired immediately and project tasks began on schedule. A bilingual moderator, with extensive expertise in qualitative research and focus group facilitation (Dr. Maria Bermudez), was retained for all groups. Development of focus group questionnaire (Table 1) began on schedule

To achieve aims #1 and 2, the recruitment team conducted following activities:

1. Identification of private domestic and/or industrial cleaning companies that employ cleaning workers through yellow pages, internet, newspapers etc.
2. Contacting housekeeping services of the major hospitals and universities in the two study site
3. Advertisement in the major Spanish language newspapers in Houston ("El Día" and "La Subasta") and Lubbock (El Editor), which are widely read by both documented and undocumented Hispanic workers.
4. Advertisement in the major English newspapers
5. Approaching local chambers of commerce, churches, civic centers and community leaders for information regarding cleaning companies in Lubbock and the Greater Houston Metropolitan Areas.
6. Conducting presentations at industrial (hospitals) workplaces
7. Distributing flyers to cleaning and custodial management companies

To achieve aims 3, 4, and 5, a total of 12 focus group sessions were planned and conducted. Active recruitment of study subjects in Lubbock began April 1, 2005. Initially, two small focus group sessions were conducted to pilot test the focus group instrument for clarity and brevity.

Twelve separate focus group sessions, six in Lubbock, Texas and six in Houston, Texas were conducted. Each focus group session was made up of six to ten participants. One session in Houston, TX was conducted in entirely Spanish to accommodate Spanish-speaking participants. Inclusion criteria for recruitment was a) age between 18 and 70 years, b) working as a domestic or industrial cleaner for at least one year, and c) willingness to participate. Study participants were recruited using a purposive and snowball sample approach from a focus group invitation

list, prepared utilizing different sources, as described above. Respondents who then contacted the research team underwent preliminary screening questions, asked by a bilingual member of the research team, to assure that they met the inclusion criteria. No questions regarding residence status, health, or of a sensitive nature were asked. Once eligibility was determined, the participant was invited and scheduled to attend the focus group meeting. A copy of the screening questionnaire is attached as Appendix C.

Focus group sessions

Focus group sessions were held in community centers in Lubbock, and in a conference hall belonging to The University of Texas Health Science Center at Houston. A bilingual study member of the research team, experienced in conducting focus group interviews served as facilitator, assisted by a session recorder, for all 12 sessions. Participants first met informally over refreshments for introductions before the focus group session begins. Sessions were audio taped, in order to maximize the capture of discussion content. As participants arrived, information about the general nature of the session, audiotaping, and measures to preserve confidentiality were provided to each participant individually (and privately), an opportunity to ask questions was given, and written informed consent to participate was obtained. Upon giving consent, respondents were asked to complete a brief one-page demographic questionnaire requesting information on age, sex, race/ethnicity, income, and educational level; participants were also asked if they would be willing to be recontacted for a follow-up session to pilot test a draft survey questionnaire. The focus group session was informal, but guided, and lasted from 1 ½ to 2 hours. The focus group sessions centered on identifying work-place exposures, types of tasks performed, and job training. Each session began with an introduction by the facilitator, followed by an *opening* question in which participants were asked to introduce themselves by

first name only. The facilitator then continued with *transition* questions that led into the central *key* questions for this project. In the end, to bring closure to the discussion, some *ending* questions were asked (Table I). Focus group guiding questions were prepared in advance by the research team, which included an occupational physician, epidemiologist, communication, and survey specialists. These questions were pilot tested in a selected group of cleaners for clarity and brevity.

Data Analysis

General demographic and descriptive characteristics of the focus group participants were summarized from the information provided in the questionnaire. Each recorded session was transcribed and word processed by professional transcribers. The interview session transcription data were cleaned and field notes were checked for errors and inconsistencies.

The focus group data were analyzed using content analysis and open coding. First, we categorized the frequency of chemicals and cleaning products reportedly used by the respondents. Second, since content analysis is limited to monitoring the occurrence of categories in a text [Reinard, 1994] and does not reveal the experiences of respondents or the context of the phenomenon being observed, we also used an open coding approach [Strauss and Corbin, 1990]. This approach explores phenomena through the identification of unknown concepts and/or variables that are relevant in this study, allowing inductively derived data to emerge [Strauss and Corbin, 1990], and emphasizing the natural setting [Denzin and Lincoln, 1994]. In particular, open coding is a qualitative method that "uses a systematic set of procedures to develop an inductively derived theory about a phenomenon" [Strauss and Corbin, 1990, p. 24]. Open coding procedures for these data occurred on two levels of thematic inference. The first level-low inference-features themes derived from standard, concrete codes (e.g., equipment use). The second level-high inference-features themes derived from latent meanings [Lindlof & Taylor,

2002]. Regardless of its level of abstraction, each theme was developed based on the content of the codes observed in the data [Tesch, 1990]. In other words, we coded both the concrete data such as equipment use as well as the participants' experiences with and/or about this concrete code. Since the professional experiences of domestic and industrial cleaning personnel are understudied, open coding allows for a descriptive and exploratory examination of their accounts.

Consistent with the open coding design [Glaser and Strauss, 1967; Strauss and Corbin, 1990], the following steps were taken to identify emerging themes: a) listening to the recorded focus groups several times; b) transcribing the focus group interviews; c) coding the data from the transcripts into categories; and finally, d) examining and summarizing the transcripts to identify the key elements, issues, and/or themes. The process of analysis involved breaking down and examining the data, comparing and conceptualizing categories, and formulating categories into themes and key ideas; as new themes emerged; old themes were reviewed and revised. A theme was considered present based on its "recurrence, repetition, and forcefulness" [Owen, 1984, p. 275]. We also abstracted a comprehensive list of chemicals and products reported by study participants. For each product we then listed all active ingredients. For each active ingredient, the corresponding Chemical Abstract Service (CAS) number was identified, and the list was then reduced to those ingredients known to be respiratory irritants or sensitizers; frequency of products occurrence in the transcript text was tabulated. Since this project involved a relatively large focus group population, the Nvivo version 2.0 qualitative analysis software [QSR International, Victoria, Australia] was used for organizing, labeling, coding, indexing, and cross-referencing data. Signed informed consent was obtained from each subject and the study protocol and survey instruments were approved by the Institutional Review Board at Texas Tech

University Health Sciences Center, and by the Committee for the Protection of Human Subjects at the University of Texas-School of Public Health at Houston.

Development of Job-Exposure Matrix (JEM)

Preliminary information gathered from this focus group study was used to identify an initial structure for the JEM (Appendix B); this include identifying work zones, chemicals, objects, and tasks; however, more work will be needed to finalize its final development and coding.

RESULTS

A total of 191 subjects (121 in Houston, TX and 70 in Lubbock, TX) responded to our recruitment efforts and were screened for their eligibility to participate in the study. A total of 150 (66 in Lubbock, 84 in Houston) subjects were found to be eligible and were invited to attend the focus group sessions. All of them initially agreed; however a total of 99 subjects participated in twelve focus group sessions: 43 attended in Lubbock and 56 in Houston for the overall participation rate of 66% (99/150). Of those who attended the focus group sessions, 37% reported that they learned about the study from family/friends/co-workers and through word of mouth, 29% from flyers/brochure, and 34% from newspaper ads. Their mean age was 43.2 years (SD=11.9). As expected, the majority were Hispanic (61%) and female (88%); The majority were non-smokers (62%) and had worked as cleaners for a mean of 9.6 years (SD=8.5); 47% worked in an industrial setting, 32% in private residences and 20% reported working in both (Table 2). A copy of the final survey instrument is attached as Appendix D.

Content Analysis

Participants reported using a total of 66 different cleaning products to clean residential, industrial, and commercial zones. From these 66 cleaning products, a total of 48 different respiratory irritants and sensitizers were identified. Fourteen of these were used more often by industrial cleaners, yet domestic cleaners reported more frequent exposure to respiratory irritants and sensitizers than industrial cleaners (Table 4). More adverse respiratory symptoms including congestion, coughing, nausea, and trouble breathing were reported by domestic cleaners as compared to the industrial cleaners. Reports of eye irritation were also common among domestic cleaners. Other frequently reported symptoms were of allergies, headache, and body ache (Table 3).

Thematic Analysis

Three general themes emerged regarding cleaning professionals' work experiences: a) job training; b) chemical exposure and use; and c) competence. *Job training* experiences ranged from informal on the job training to formal training with testing and supervision as well as access to and use of proper clothing and equipment. The theme of *Chemical Exposure and Use* included participant descriptions of perceived effects of their exposure due to use. The theme of *Competence* described participant perceptions of their own knowledge of the chemicals they used. In most cases, marked differences in experiences between domestic and industrial cleaners were identified. Following Lindlof and Taylor [2002] and Ballard et al. [2004] exemplar comments supporting these themes are presented in a summary table (see Table 5 for exemplar comments for these three themes).

Job training

Participants from both sets of focus groups described their training. These descriptions ranged from no training and informal training to formal training. Typically, respondents working in domestic settings reported receiving no training or merely informal training. In most cases, these participants reported that their training occurred on-the-job provided by a partner who in most cases was a relative or friend. Many domestic cleaners claimed to rely on the advice of others regarding chemical use. It is clear that each group defined job training differently. For example, domestic cleaners described their training as not instructive, but as being trained through trial and error. These participants reported being given an area to clean using whatever the partner or household provided. In contrast, industrial cleaners reported receiving a variety of levels of formal training such as examinations, inspections of surfaces and rooms, as well as being partnered with an experienced co-worker before given individual responsibilities. Although these participants described their training as thorough, they also described having to cut corners and frequently violate organization policy in order to do their jobs. For example, they expressed concern over the quality of equipment and clothing provided to them. The most common complaint among these industrial employees was poorly fitting protective clothing. Several reported that protective suits and shoes were made to fit most people, yet, most described a poor fit for themselves. In fact, many felt that wearing poorly fitting protective clothing posed a greater risk of exposure than if they wore their own clothes. Additionally, many reported that protective clothing tended to be in short supply. Domestic cleaners did not describe concerns or problems with protective clothing or equipment.

Chemical Use and Exposure

Focus group participants also described their on-the-job exposure to a variety of cleaning chemicals. Just as domestic and industrial cleaner's job training experiences differed, so did the self-reported effects of cleaning and chemical exposure. In most cases, domestic cleaners reported experiencing more physical symptoms during and following a day of cleaning than industrial cleaners. However, industrial cleaners described organizational features such as management, communication with other organizational personnel, and equipment problems as contributing to their risk of exposure to chemicals. Most of the domestic cleaning respondents reported feeling sick in general as well as reported specific symptoms during and after a day of cleaning. While the domestic cleaners in our study reported symptoms directly related to cleaning, the industrial cleaners in this study reported that their symptoms and exposure risks were influenced more often by their interactions with other non-cleaning personnel and their access to appropriate cleaning equipment (Table 5).

Competence

Participants also discussed their knowledge of the chemicals they used as well as their cleaning skills in general. In most cases, industrial cleaners displayed moderate to high levels of knowledge about their jobs. However, the competence displayed by the participants during the interviews with domestic cleaners varied significantly. For example, many displayed an understanding for the need to avoid combining certain chemicals to prevent reactions. Whereas this shows one example of the relatively moderate to high levels of competence among some domestic cleaners, other domestic cleaners displayed little competence in their discussions of their cleaning skills and techniques. For example, it appeared many do not consider exposure to their bodies as cleaning-related risks (although many have reported experiencing physical

symptoms during and following cleaning). Additionally, many domestic cleaners displayed little knowledge of which cleaning products were most appropriate for particular surfaces and tasks. Industrial cleaners displayed significantly more job and skill competence. Most industrial cleaners remarked that each employee has a specific job he or she is assigned. An employee's assignment was given based on his/her specific job skill. For example, most industrial cleaners distinguished themselves based on these assignments. Furthermore, these participants attributed having a cleaning routine contributed to their efficiency and job safety (Table 5).

DISCUSSION

In this study of domestic and industrial cleaners, focus groups were used to solicit and collect information on cleaning tasks and exposures for the purpose of characterizing and identifying occupational exposures in this population. It is only recently that occupational health hazards potentially associated with cleaning chemicals has been recognized [Arif et al., 2003; Medina-Ramon et al., 2006]. This study finds that household and industrial cleansers use multiple products during their cleaning tasks. These include disinfectants, general purpose cleaners, carpet cleaners, glass cleaners and bathroom cleaners. Many of the active components found in these cleaning agents are established respiratory tract irritants or sensitizers and include *solvents* (e.g., ammonia, ethanol); *alkalis* such as sodium hypochlorite (bleach); *surfactants* (e.g., Sodium laureth sulfate); *builders* (e.g., acetic acid); and *antimicrobials* (e.g., glutaraldehyde, and dialkyl and dimethyl ammonium chlorides). Most of these cleaning substances are highly volatile and readily evaporate during cleaning processes, making them accessible to the breathing zone of workers and, consequently the upper and/or lower airways. Furthermore, mixtures of certain cleaning agents (e.g., bleach and ammonia) can be particularly hazardous to

the respiratory tract and are a frequent cause of emergency room visits and calls to poison centers [Blanc et al., 1989; Attfield et al., 2003].

Several participants reported experiencing adverse physical symptoms during or following cleaning activities. These were common among domestic cleaners and include both respiratory (congestion, cough, breathing trouble) and ergonomic (body ache) symptoms. These symptoms were often associated with specific tasks. For example, one of the female domestic cleaner linked her occurrence of symptoms with cleaning vents.

> *"When I have time I do, and I tell them and they have told me I need to call them and clean the whole vent. You know you are just breathing the same and they causes a lot of coughing and congestion, allergies, etc."*

In a prospective study, Neilson and Bach [1999] found an increased risk of upper respiratory symptoms among Danish female cleaners, especially in association with the use of sprayers. Similarly, in a Finnish record linkage study, female cleaners were reported to be 1.5 times more likely to develop asthma as compared to administrative workers; cleaners involved in food processing and basic metal manufacturing tasks had the highest risk of asthma [Karjalainen et al., 2002]. Medina-Ramon et al., [2006] in a panel study of 43 female domestic cleaners, with a history of obstructive lung disease, reported significant positive associations between report of lower respiratory tract symptoms and performing several cleaning tasks including dusting, vacuuming, cleaning bathroom and kitchen. In addition, significant positive association was observed with exposure to diluted bleach, degreasing sprays, ammonia, and air fresheners. The most common respiratory symptom reported by study participants was cough similar to observed in this study. The authors suggested that the peak flow patterns observed was suggestive of occupational asthma in 30% of study participants. Similarly, in a Spanish study of indoor cleaners, Zock et al. [2001] reported a prevalence ratio of 1.7 (95% CI 1.1-2.6) among indoor

cleaners when compared to a referent group of office workers. The risk was highest among private home cleaners (OR=3.3, 95%CI 1.9-5.8) who also showed a high prevalence of sensitization to house dust mites. Furthermore, the prevalence ratio was highest among those cleaners who reported cleaning kitchens and polishing furniture. Those who reported using oven sprays and polishes were four times more likely to report asthma as compared to the referent group. The higher prevalence of respiratory symptoms observed among domestic workers in this study confirms earlier findings that domestic cleaners may be at higher risk of developing adverse respiratory health effects.

There were some considerable differences observed between domestic and industrial cleaners in report of type of products, which were respiratory irritants or sensitizers, used while performing cleaning tasks. Domestic cleaners reported frequent use of products that contain triethanolamine, ammonia, phosphoric acid, sodium dodecylbenzenesulfonate, and sodium hypochlorite (bleach), whereas industrial cleaners reported frequent use of products that contain sodium xylene sulfonate, monoethanolamine, and glutaraldehyde. Ethanolamine, an organic chemical compound, is commonly present in consumer products used as hard surface cleaner, disinfectants, or floor stripper/paint removers. Domestic cleaners reported most commonly using products containing triethanolamine, frequently mixing it with bleach or water to clean bathrooms or floors, whereas industrial cleaners reported using industrial strength products containing monoethanolmine. Savonius [1994] described three cases of occupational asthma, two among metal workers exposed to triethanolamine and one among cleaner exposed to monoethanolmine. Oral ingestion of detergent containing monoethanalime has been reported to result in death due to acute respiratory distress syndrome [Kamijo et al., 2004]. Apart from these case reports, to our knowledge, there is not enough information available at the population level to characterize respiratory health effects from exposure to this organic compound.

Ammonia and sodium hypochlorite (commonly known as bleach), which are strong respiratory irritants, were present as an active ingredient in products commonly used as disinfectants and stripper/stain/paint removers. In a recent nested case-control study of female domestic cleaners, exposure to diluted ammonia was associated with three times the odds of lower respiratory symptoms and exposure to bleach was associated with more than twice the odds of lower respiratory symptoms [Medina-Ramon et al., 2006].. The potential for acute exposure is especially high during mixing of ammonia and bleach together which generates chloramines. High level exposure to chloramine gas has been linked with acute lung injury [Tanen et al., 1999]. In this study inappropriate mixing, because of lack of training, was evident among domestic cleaners as reflected in the following quotes from two participants.

> *"once a month in house that need it I use a cleaner with acid in it and every time it bothers my nose and always gives me headache...I don't like to use it much."*

> *"I think it's basically trial and error. If I made a big booboo I'd say 'uh, oh' and never do it again...like mixing ammonia."*

In addition to identifying the hazards associated with cleaning chemicals, this study also identified patterns of work experiences among domestic and industrial cleaners. These patterns clearly show how cleaners' knowledge, competency, and use of cleaning chemical may contribute to their exposure to chemical hazards. Additionally, these patterns reveal clearly several distinctions between the experiences of domestic and industrial cleaners. The most notable among these distinctions tells us that there is a significant skills deficit among domestic cleaners across each of these three themes. This is concerning given these domestic cleaners are exposed to a greater number and variety of respiratory irritants and reported more physical symptoms while cleaning than industrial cleaners.

One limitation of this study was lack of involvement of employers. A separate focus group of employers (homeowners or industrial employers) may provide their perspective on occupational exposures at work-places. We planned at least two Spanish language only focus group sessions; however we were not able to recruit additional Spanish speaking cleaners and conducted only one focus group session in Spanish. Another limitation of this study was the lack of contribution from the participants in the focus group who reported working in both domestic and industrial setting. This group was formed to confirm distinctions between and similarities among the experiences of both groups of cleaners and allow members of both cleaner groups to share and compare experiences. While some members provided their experiences, these contributions confirmed the themes already identified in the previous separate groups, no new themes emerged from this group. Additionally, the focus group approach itself is limited in scope. While efficient, the general purpose of focus group methods is to promote convergence among group members [Morgan 1997]. As a result of this agreement, important individual experiences such as gender differences may be undisclosed. Future, research should conduct individual interviews with industrial and domestic cleaners to undercover these individual experiences.

CONCLUSIONS: In conclusion, this qualitative study revealed some interesting differences in workplace practices and exposures between domestic and industrial cleaners. Domestic cleaners are clearly at risk of exposure to chemicals that are respiratory irritants and/or sensitizers. Use of qualitative research methodology enabled us to gain understanding of the work processes which will help us develop better quantitative instruments to confirm our findings and will be very valuable as newer occupational epidemiological studies of cleaners, with stronger designs, are conceptualized.

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PUBLICATIONS

To date, one manuscript has been submitted and is under review by the American Journal of Industrial Medicine. One abstract has been published in the Annals of Epidemiology.

A.A. Arif, P.C. Hughes and G.L. Delclos. Occupational Asthmagens among Domestic and Industrial Cleaners: A Qualitative Study. Annals of Epidemiology, 2007, 17(9): *733-734.* doi: 10.1016/j.annepidem.2007.07.035

INCLUSION OF GENDER AND MINORITY STUDY SUBJECTS

Inclusion Enrollment Report Table

This report format should NOT be used for data collection from study participants.

Study Title: Occupational Asthmagens in Cleaners: A focus group study

Total Enrollment: 99 **Protocol Number:** L05-006

Grant Number: 1R03OH008136-01

PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race

Ethnic Category	Sex/Gender			
	Females	Males	Unknown or Not Reported	Total
Hispanic or Latino	53	7	0	60 **
Not Hispanic or Latino	34	5	0	39
Unknown (Individuals not reporting ethnicity)	0	0	0	0
Ethnic Category: Total of All Subjects*	87	12	0	99 *
Racial Categories				
American Indian/Alaska Native	0	0	0	0
Asian	1	0	0	1
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	23	3	0	26
White	21	3	0	24
More than one race	0	0	0	0
Unknown, Other, or not reported	42	6	0	48
Racial Categories: Total of All Subjects*	87	12	0	99 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not Reported	Total
American Indian or Alaska Native	0	0	0	0
Asian	1	0	0	1
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	1	0	0	1
White	11	1	0	12
More Than One Race	0	0	0	0
Unknown, other, or not reported	40	6	0	46
Racial Categories: Total of Hispanics or Latinos**	53	7	0	60 **

* These totals must agree.
** These totals must agree.

INCLUSION OF CHILDREN

The study population included only adults and did not involve children.

MATERIALS AVAILABLE FOR OTHER INVESTIGATORS

Copies of all the questionnaires are available through the Principal Investigator at the following address:

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email: aarif@uncc.edu

Appendix A

Tables

TABLE 1. Focus Group Questions

WORK SETTING AND CONDITIONS

1. Ice Breaker:
   a) Please tell us your first name or a made-up name and a little bit about what's your favorite thing to do.

2. Tell us what you do in a typical work day at the job?
   a) How often do you do it? (daily , weekly, monthly, yearly)
   b) Probe for tasks performed in kitchen, bathroom, rooms etc (zones)

3. What type of cleaning products or solutions or chemicals do you use?
   a) How do you use it?
   b) PROBE : use as is or do you combine or "doctor"
   Try to identify products used with each activity described in Question 2

4. What kind of supplies or equipment do you use?

5. What do you wear when you clean?
   a) For example, your clothing, on your hands, feet, eyes, head, etc.
   b) Do you like or want to use what you wear?

TRAINING

6. What kind of training did you receive that prepared you to handle cleaning solutions or whatever you use or cleaning?
   a) How was the training conducted?
   b) Who trained you to do the job were you work now?
   a) Did you have to take a test or show that you knew how to use the cleaning supplies or equipment?
   b) Is there anything else you would like to add about your training?

7. Describe your work environment?
   a) How do you describe the conditions of your workplace?
   b) What do you like about it?
   c) What do you dislike about it?

RECRUITMENT

8. How did you hear about this study today?
9. What motivated you to take part in the study today?
10. What do you think keeps others from coming?
11. What ideas do you have that could help us recruit people who work in the cleaning business.
12. Is there anything else you want to add to our discussion today?

TABLE 2: Demographic Characteristics of the Study Population

		All	Domestic	Industrial	Both
TOTAL		99	32 (32.3)	47 (47.5)	20 (20.2)
Age	Mean (SD)	43.2 (11.9) yrs	44.0 (12.9)	42.8 (11.3)	43.0 (11.9)
Gender	Female	87 (87.9)	29 (90.6)	38 (80.9)	20 (100.0)
	Male	12 (12.1)	3 (9.4)	9 (19.2)	
Ethnicity	Hispanic	60 (60.6)	17 (53.1)	34 (72.3)	9 (45.0)
	Anglo	12 (12.1)	3 (9.4)	5 (10.6)	4 (20.0)
	African Am.	25 (25.2)	12 (37.5)	7 (14.9)	6 (30.0)
	Other	2 (2.0)	0	1 (2.1)	1 (5.0)
Years Worked	Mean (SD)	9.6 (8.5) yrs	9.0 (9.0)	10.1 (8.6)	9.2 (7.8)
	Median	5 yrs	5	7	5.5
	Range	1-34 yrs	2-30 yrs	1-34 yrs	2-30 yrs
Hours per week	Mean (SD)	27.3 (12.9) hrs	20.5 (11.8)	36.0 (7.7)	17.2 (10.6)
	Median	30.0 hrs	20	40	16
	Range	3-50 hrs	3-50 hrs	8-40 hrs	3-40 hrs
Smoking Status	Non-Smoker	61 (62.2)	23.0 (71.9)	30 (65.2)	8 (40.0)
	Current Smoker	23 (23.5)	6 (18.8)	8 (17.4)	9 (45.0)
	Ex-smoker	14 (14.3)	3 (9.4)	8 (17.4)	3 (15.0)

TABLE 3. Summary of Content Analysis of Self-Reported Physical Symptoms of Domestic and Industrial Cleaners During and Following Cleaning tasks

Symptoms	Domestic	Industrial
Allergy	13	11
Body Ache	16	0
Congestion	15	0
Coughing	16	4
Eye Burning	7	3
Headache	17	21
Nausea	22	5
Rash	6	1
Skin Bleeding	3	0
Skin Burning	9	8
Trouble Breathing	19	3

TABLE 4. Summary of Content Analysis of Chemical Use and Exposure to Respiratory Irritants and Sensitizers of Domestic and Industrial Cleaners

Chemical Purpose	Chemical name	Domestic	Industrial
All-purpose degreaser, deodorizer, disinfectant			
	Triethanolamine	13	-
	Ammonia	11	6
	Sodium dodecylbenzenesulfonate	10	-
	Sodium Carbonate	9	-
	Quartz	7	-
	Sodium hypochlorite	6	-
	Alkyl dimethyl benzyl ammonium chloride	5	-
	Monoethanolamine (ethanolamine)	3	14
	Acetic acid	3	-
	Sodium Xylene Sulfonate	-	15
	Glutaraldehyde	-	8
Dishwashing Soap			
	Phosphoric Acid	11	-
	Sodium Carbonate	9	-
	Sodium silicate	5	-
	2-amino-1-propanol	3	-
	Cleaning agents (unspecified)	3	-
	Bleach (unspecified)	3	-
	Sodium laureth sulfate	2	-
	Sudsing agent	1	-
Carpet Sanitizer/Deodorizer			
	Dialkyl dimethyl ammonium chloride (triethylamine)	-	6
	Nonyl phenol ethoxylate	-	3
	Sodium Bicarbonate	2	2
Floor cleaner			
	Monoethanolamine (ethanolamine)	3	14
	Polyacrylic acid	-	11
	Alkyl dimethyl benzyl ammonium saccharinate	5	6
	Dialkyl dimethyl ammonium chloride (triethylamine)	-	6
	2-Butoxyethanol (butyl cellusolve) (Ethyleneglycolmonobutylether)	-	5
	2-Butoxyethanol (butyl cellusolve) (Ethyleneglycolmonobutylether)	-	5
	Diethanolamine	-	3
	Sodium silicate	5	-
	Sodium Metasilicate	5	-

Chemical Purpose	Chemical name	Domestic	Industrial
Stripper/Stain/Paint Remover			
	Ammonia	11	6
	Methylene chloride	6	2
	Monoethanolamine (ethanolamine)	3	14
	Sodium Percarbonate	3	-
	2-Butoxyethanol (butyl cellusolve) (Ethyleneglycolmonobutylether)	-	5
Furniture dust remover			
	Isoparaffinic Hydrocarbon	6	-
	Naphtha, petroleum, hydrotreated heavy	5	-
	Hydrocarbon solvent (unspecified)	5	-
Bathroom Chemicals			
	Phosphoric Acid	11	-
	Hydrochloric Acid (hydrogen chloride)	9	-
	Dialkyldimethylammonium methyl sulfate	7	-
	Sodium hypochlorite	6	-
	Alkyl dimethyl benzyl ammonium chloride	5	-
	Trisodium nitrilotriacetate	5	-
	Dehydroabietylamine (1-phenanthrenemethanamine)	3	1
	Bleach (unspecified)	3	-

TABLE 5. Themes of Domestic and Industrial Experiences With Job Training, Chemical Exposure and Use, and Perceptions of Competence

Job Training

Domestic

"I learned in a trial and error way. My mother would just tell me which room she wanted me to clean and I would just use which solutions she had."

"We go on the advice from others who have said they have used this product or that product and then we use it."

"I think it's basically trial and error. If I made a big booboo I'd say 'uh, oh' and never do it again...like mixing ammonia."

Industrial

"My cleaning would be inspected after I cleaned and I would just learn how to clean better each time the supervisor told be to redo it."

"I clean what my supervisors tell me to clean."

"They assume you don't know anything when you're hired so they show you how to do everything then they'll give you certain areas to clean and later they will check your work. If you pass then they'll give you your own area."

"We had to go through training...we had a written test on how to use the equipment and chemicals and about which chemicals clean which surfaces."

"They have these suits, shoes, and gloves that they want us to wear but they don't fit most of us and there aren't enough to go around to the people who can wear them."

Chemical Exposure and Use

Domestic

"Once a month in houses that need it I use a cleaner with acid in it and every time it bothers my nose and always gives me headache...I don't like to use it much."

"We cleaned an empty house the other day when the people moved out and we got real sick after we got home we just hurt all over and we don't know what caused it."

"We did this one house and got rid of all those webs and did the real deep cleaning it was very dusty. I went home and I just didn't feel good and then my body started hurting. Normally I don't go to bed without dinner, but that day I didn't want to move."

Industrial

"Once I was called down to an examination room to clean the floor because something spilled on it. One of those sonogram machines leaked and I needed to clean up the mess. Well, I didn't have gloves and later I learned that the liquid in the machine might cause cancer."

"We have a machine that mixes all of our chemicals, but I'm really little and our clothing is one-size-fits all.

The shoes and the suits really don't fit me well. It would be easier if I just wore my own clothes."

"The suit and gloves make my face and hands sweat a lot and causes my itching but you can't scratch your face with your hands because you might get something in your eyes."

Competence

Domestic

"If there are children in the household that tend to run around or are little, make sure that if you do put bleach in the toilet not to let them go in there and use the bathroom, because the ammonia in urine and the bleach will cause respiratory problems. That did happen to one of my sister-in-law's little girls, and they had to take her into the emergency room."

"You don't want to mix ammonia and bleach I really don't use these anymore because these chemical can cause cancer and damage your lungs. I have switched to natural cleaners like vinegar it's safer and works just as well."

"I really don't wear anything except shorts and t-shirts and my tennis shoes when I clean and I don't buy goggles or masks…I just want to be comfortable when I work."

"I don't wear goggles, I wear contacts so fumes really don't bother my eyes…ammonia doesn't bother me, but I can feel it when I take them out at the end of the day."

"I just use whatever she has in her basket. If she has bleach I use bleach, if she has ammonia I use ammonia, if she has acid and so on, if she has nothing I'll just use soap and water, but I can usually find something to use."

Industrial

"I'm one of the only employees who clean floors. The others have their own jobs they're responsible for doing. If you're new you'll probably be picking up trash and emptying trash cans and sweeping. You'll get a different job when you get trained and have more experience…I know which days I'll be on floors and which days I'll be another job…it is organized."

"You'll be given a job to do and you'll need to do that job mostly each and every day and you'll be doing that job in the same place like a building and you'll get to know that building and that job very well then you'll move on to another job and place.

Appendix B

JOB-EXPOSURE MATRIX STRUCTURE

Zones	Chemicals	Clothing	Symptoms	Body	Objects	Tasks
Bathroom Bedroom Classrooms Dining Room Discharge Room Elevator Examination Room Garage Hallway Hospital Room Kitchen Living Room Lobbies Morgue Nurse Station Offices Porch Utility Room	Acid Ammonia Bleach Chemical Reaction Cidex Dilute Chemicals Fumes Furniture Polish Hydrogen Peroxide Mix Oil Paint Remover Quantity of Chemicals Stripper Snowbowl Glass Cleaner Carpet Fresh Lime Away CLR Barkeeper's Friend Vinegar Pledge Swifter Wetsite Strippee Comet Fantastic OxyPower Windex Joy Moldmaster 3 in 1 Oil Tilex Vomine Ajax Easy Off Mr. Muscle Outmost GoofOff Revive UHS ST724	Aprons Boots Goggles Gowns Latex Gloves Mask Old Clothes Pants Plastic Shoes Protective Suit Rings Rubber Shoes Shorts Tennis Shoes T-shirt Uniforms	Allergy Bleeding Body Ache Breathing Burning Congestion Coughing Feeling Sick Headache	Eyes Face Fingers Hair Hands Knees Lungs Mouth Nose Skin Toe	Bathtub Blinds Dishwasher Dryers Fans Faucet Fireplace Garbage Disposal Gold Fixtures Grills Heating Elements Lighting Ovens Refrigerator Shower Shutters Sink Stove Toilets Washers Water Fountain	Bed making Carpet steaming Changing light bulbs Cleaning bathtub Cleaning floors Cleaning kitchen Cleaning showers Cleaning Sinks Cleaning Toilets Collecting trash Disposing trash Doing laundry Dusting sweeping Floor waxing Folding laundry Making beds Mopping floors Rubbing Scouring Scraping Scrubbing Spot removal Stain removal Stain removal Vacuuming Washing dishes Washing windows Waxing Cleaning litterbox Buffing floors Sweeping Cleaning chemical spills Floor stripping

Appendix C

SCREENING QUESTIONNAIRE

Eligible: Yes / No
Agree to Participate: Yes / No
ID: OAC _ _ _ _ UT

Focus group no. _____ Confirm. letter _____
Confirm. call _____ Thank you letter _____

Date:_____

Filled out by:_____

1) Are you between 18 and 70 years of age?	☐ Yes ☐ No ----------→	☐ *NOT Eligible* **(Go to Question 11 and STOP)**
2) Are you currently working as a cleaner in a home or business?	☐ Yes ☐ No ----------→	☐ *NOT Eligible* **(Go to Question 11 and STOP)**
3) How many years have you worked cleaning homes/businesses? *(must = 1 or more years, round down to whole years rounded down.)*	☐ ____ years ☐ < one year --→	☐ *NOT Eligible* **(Go to Question 11 and STOP)**

4) What kind of work do you do? (*Domestic = Home, Industrial =Factory, Business, Office, Hospital, School)*

☐ Domestic
☐ Industrial
☐ Both

The following contact information is needed to send focus group information to each participant. This information will be maintained in a secure database to assure confidentiality of each participant.

5) First Name:_____ Last Name:_____

6) Address:_____

7) City: _____ State: _____ Zip: _____

8) Home Phone: _____ 9) Other Phone: _____

10) Best Contact Phone: _____

11) How did you hear about this study?

☐ Newspaper
☐ Flyer Posted
☐ Received a brochure/handout
☐ Friend
☐ Other

FOCUS GROUP ASSIGNMENT

Now we're ready to place you in a focus group? To make this as convenient for you as possible, in general, what days or times ar convenient for you to meet?

☐ Week days ☐ Week nights ☐ Weekends SPANISH ONLY

FG 1	FG 2	FG 3	FG 4	FG 5	FG 6

Gender: M / F Language: _____

Appendix D

OAC QUESTIONNAIRE

OAC Baseline Questionnaire

Section 1: Occupational History

We would like you to think about the current cleaning job which we will visit you at for this study. Please provide answers for the cleaning job which we will visit you at for this study.

Current Job

The following questions pertain to your current cleaning job. **This should also be the cleaning job which we will visit you at for this study.**

1. Where is this current cleaning job? _____

2. In which month and year did you begin this current job? ____/_____

3. On how many days a week at this **current job** do you perform the following cleaning **tasks**? (***Indicate an X for each)***

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Bathroom				
Cleaning bathtub				
Cleaning shower				
Mopping floor				
Sweeping floor				
Stripping floor				
Waxing floor				
Cleaning sink				
Cleaning/polishing faucet				
Cleaning toilet				
Polishing metal				
Collecting trash				
Stain removal				
Cleaning the mirror				
Cleaning air vent				
Other				
Kitchen				
Stripping floor				
Waxing floor				
Sweeping floor				
Vacuuming floor				
Mopping floor				
Cleaning sink				
Polishing/cleaning faucet				
Collecting trash				
Spot/stain removal				
Cleaning oven				
Washing dishes				
Cleaning disposal				
Loading dishwasher				
Cleaning refrigerator				
Cleaning stove				
Cleaning microwave				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Cleaning stove hood/vent				
Other				
Other				
Bedrooms (All bedrooms)				
Bed making				
Vacuuming				
Mopping floor				
Sweeping floor				
Waxing floor				
Carpet cleaning/stain removal				
Collecting trash				
Dusting				
Washing windows				
Cleaning shutters/blinds				
Cleaning ceiling fan/s				
Cleaning walls/baseboards				
Other				
Living Areas (All living areas)				
Vacuuming floor				
Sweeping floor				
Carpet cleaning/stain removal				
Floor stripping				
Floor waxing				
Floor buffing				
Collecting trash				
Dusting furniture				
Washing windows				
Cleaning blinds/shutters				
Cleaning fans				
Cleaning fireplace				
Cleaning walls/baseboards				
Cleaning/changing lighting				
Cleaning doors/glass doors				
Other				
Utility Room				
Cleaning washer/dryer				
Wash clothes with machine				
Wash clothes by hand				
Folding laundry				
Sweeping floor				
Vacuuming floor				
Mopping floor				
Cleaning fan				
Cleaning sink				
Cleaning blinds				
Clean light fixtures				
Other				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Classrooms				
Cleaning desks				
Vacuuming				
Carpet steaming/cleaning				
Floor stripping				
Floor waxing				
Mopping floor				
Buffing floor				
Sweeping floor				
Cleaning sinks				
Collecting trash				
Dusting				
Spot/stain removal				
Washing windows				
Changing light bulbs				
Other				
Lobbies/Offices				
Dusting				
Vacuuming				
Carpet steaming/cleaning				
Floor stripping				
Floor waxing				
Mopping floor				
Buffing floor				
Sweeping floor				
Cleaning sinks				
Washing dishes				
Collecting trash				
Cleaning fridge				
Changing light bulbs				
Cleaning toilet				
Spot removal				
Washing windows/mirrors				
Cleaning water fountain				
Cleaning microwave				
Cleaning oven				
Cleaning blinds/shutters				
Polishing metal				
Other				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Hospital/Room				
Sweeping floor				
Stripping floor				
Waxing floor				
Buffing floor				
Mopping floor				
Vacuuming				
Carpet steaming/cleaning				
Cleaning toilet				
Cleaning sink				
Cleaning/polishing sink				
Cleaning shower				
Cleaning bathtub				
Disinfecting				
Cleaning bio spills				
Cleaning chemical spills				
Washing windows/mirrors				
Making bed				
Changing light bulbs				
Cleaning light fixtures				
Collecting trash				
Disposing trash				
Doing laundry				
Folding laundry				
Dusting				
Cleaning blinds/shutters				
Cleaning water fountain				
Polishing metal				
Other				

4. On how many days a week do you use the following cleaning products (at this current job)? (***Indicate an X for each)***

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Decalcifiers				
Dishwashing Liquid/Soap				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
All-purpose cleaners				
Floor Cleaner/Stripper				
Furniture oil/polish/Spray				
Germicidal/Disinfectant				
Glass cleaner/mirror cleaner				
Toilet Bowl Cleaner				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Oven Cleaner				
Sink/Counter/Tub Cleaner				
Stain/Paint Remover				
5. On how many days a week do you use perfumed or scented cleaning products at your current job?				

6. Did you wear any of the following protective gear while you clean at this current job? ***(Indicate Yes or No for each)***

	(1)Yes	(2) No
Aprons	☐	☐
Protective Shoes	☐	☐
Goggles	☐	☐
Gloves	☐	☐
Protective suit/uniform	☐	☐
Protective face mask	☐	☐
Other_____	☐	☐

7. Is this current job also your longest job ***(longer than 6 months)***?

Yes **(Go to Question 15)** ☐ (1)

No **(Go to Question 8)** ☐ (2)

Longest Job

The following questions are about your longest held cleaning job. **This should be a cleaning job that you worked at for at least 6 months or longer.**

8. Where was your longest cleaning job ***(at least 6 months)***? _____

9. In which month and year did you begin your longest held job? ____/_____

10. In which month and year did you end your longest held job? ____/_____ ☐ (8)Still working at this job

11. On how many days a week at the **longest held job** did you perform the following cleaning **tasks**? ***(Indicate an X for each)***

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Bathroom				
Cleaning bathtub				
Cleaning shower				
Mopping floor				
Sweeping floor				
Stripping floor				
Waxing floor				
Cleaning sink				
Cleaning/polishing faucet				
Cleaning toilet				
Polishing metal				
Collecting trash				
Stain removal				
Cleaning the mirror				
Cleaning air vent				
Other				
Kitchen				
Stripping floor				
Waxing floor				
Sweeping floor				
Vacuuming floor				
Mopping floor				
Cleaning sink				
Polishing/cleaning faucet				
Collecting trash				
Spot/stain removal				
Cleaning oven				
Washing dishes				
Cleaning disposal				
Loading dishwasher				
Cleaning refrigerator				
Cleaning stove				
Cleaning microwave				
Stripping floor				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Cleaning stove vent/hood				
Other				
Other				
Bedrooms (all)				
Bed making				
Vacuuming				
Mopping floor				
Sweeping floor				
Waxing floor				
Carpet cleaning/stain removal				
Collecting trash				
Dusting				
Washing windows				
Cleaning shutters/blinds				
Cleaning ceiling fan/s				
Cleaning walls/baseboards				
Other				
Living Areas (all)				
Vacuuming floor				
Sweeping floor				
Carpet cleaning/stain removal				
Floor stripping				
Floor waxing				
Floor buffing				
Collecting trash				
Dusting furniture				
Washing windows				
Cleaning blinds/shutters				
Cleaning fans				
Cleaning fireplace				
Cleaning walls/baseboards				
Cleaning/changing lighting				
Cleaning doors/glass doors				
Other				
Utility Room				
Cleaning washer/dryer				
Wash clothes with machine				
Wash clothes by hand				
Folding laundry				
Sweeping floor				
Vacuuming floor				
Mopping floor				
Cleaning fan				
Cleaning sink				
Cleaning blinds				
Clean light fixtures				
Other				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Classrooms				
Cleaning desks				
Vacuuming				
Carpet steaming/cleaning				
Floor stripping				
Floor waxing				
Mopping floor				
Buffing floor				
Sweeping floor				
Cleaning sinks				
Collecting trash				
Dusting				
Spot/stain removal				
Washing windows				
Changing light bulbs				
Other				
Lobbies/Offices				
Dusting				
Vacuuming				
Carpet steaming/cleaning				
Floor stripping				
Floor waxing				
Mopping floor				
Buffing floor				
Sweeping floor				
Cleaning sinks				
Washing dishes				
Collecting trash				
Cleaning fridge				
Changing light bulbs				
Cleaning toilet				
Spot removal				
Washing windows/mirrors				
Cleaning water fountain				
Cleaning microwave				
Cleaning oven				
Cleaning blinds/shutters				
Polishing metal				
Other				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Hospital/Room				
Sweeping floor				
Stripping floor				
Waxing floor				
Buffing floor				
Mopping floor				
Vacuuming				
Carpet steaming/cleaning				
Cleaning toilet				
Cleaning sink				
Cleaning/polishing sink				
Cleaning shower				
Cleaning bathtub				
Disinfecting				
Cleaning bio spills				
Cleaning chemical spills				
Washing windows/mirrors				
Making bed				
Changing light bulbs				
Cleaning light fixtures				
Collecting trash				
Disposing trash				
Doing laundry				
Folding laundry				
Dusting				
Cleaning blinds/shutters				
Cleaning water fountain				
Polishing metal				
Other				

12. On how many days a week did you use the following cleaning products (at the longest held job)? (***Indicate an X for each)***

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Decalcifiers				
Dishwashing Liquid/Soap				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
All-purpose cleaners				
Floor Cleaner/Stripper/Wax				
Furniture oil/polish/Spray				
Germicidal/Disinfectant				
Glass cleaner/mirror cleaner				
Toilet Bowl Cleaner				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Over Cleaners				
Sink/Counter/Tub Cleaner				

Stain/Paint Remover				
13. On how many days a week did you use perfumed or scented cleaning products at this longest job?				

14. Did you wear any of the following protective gear while you were cleaning at your longest held job? ***(Indicate Yes or No for each)***

	(1)Yes	(2) No
Aprons	☐	☐
Protective Shoes	☐	☐
Goggles	☐	☐
Gloves	☐	☐
Protective suit/uniform	☐	☐
Protective face mask	☐	☐
Other_____	☐	☐

These next questions ask you questions about **ALL** of your current cleaning jobs.

15. How many different cleaning jobs do you currently have? _____

16. Please list the kind of place for each cleaning job and the numbers of hours you clean there each week. ***(factory, office, shop/store, private home, hospital, school, etc)***

Place 1: _____ Hrs/wk _____

Place 2: _____ Hrs/wk _____

Place 3: _____ Hrs/wk _____

Place 4: _____ Hrs/wk _____

Place 5: _____ Hrs/wk _____

17. In total, how many hours per week do you typically spend cleaning at **home AND work**? _____

18. How many days per week do you normally **work** doing cleaning? _____

Section 2: Household Characteristics

The next questions are about your own home. Please feel free to ask another member of your household for assistance if necessary.

19. Which of the following best describes your home structure?

Mobile home or trailer ☐ (01)
One family house or townhouse detached from any other house ☐ (02)
One family house or townhouse attached on one side to another unit ☐ (03)
One family house or townhouse attached on both sides to houses ☐ (04)
Building with 2 apartments, condos, or co-ops ☐ (05)
Building with 3 or 4 apartments, condos, or co-ops ☐ (06)
Building with 5 to 9 apartments, condos, or co-ops ☐ (07)
Building with 10 or 19 apartments, condos, or co-ops ☐ (08)
Building with 20 to 49 apartments, condos, or co-ops ☐ (09)
Building with 50 or more apartments, condos, or co-ops ☐ (10)
Other (specify) _____ ☐ (11)

20. What is the approximate square footage of your home? sq. ft _____

21. How many rooms are there in your home? ***(Do NOT count bathrooms, porches, balconies, foyers, halls or half-rooms)*** _____

22. What type of flooring do you have? ***(Select all that apply)***

Hardwood without area rugs ☐ (1)
Hardwood with area rugs ☐ (2)
Wall-to-wall carpet ☐ (3)
Tile without area rugs ☐ (4)
Tile with area rugs ☐ (5)
Vinyl, linoleum or laminate ☐ (6)
Cement ☐ (7)
Other (specify)_____ ☐ (8)

23. How many rooms in your home are carpeted or have rugs covering more than 50% of the floor space? _____

24. What type of exterior siding is on your home? ***(Select all that apply)***

Wood ☐ (1)
Brick ☐ (2)
Vinyl/aluminum ☐ (3)
Stucco ☐ (4)
Asbestos/asphalt ☐ (5)
Other (specify)_____ ☐ (6)

25. Is your home

Owned by someone living in this house ☐ (1)
Rented ☐ (2)
Occupied without payment/in exchange for maintenance ☐ (3)
Subsidized housing ☐ (4)

26. About when was this building first built? ***(If you are not sure, you can ask other house members.)***

Less than 5 years ago ☐ (1)
1995-2000 ☐ (2)
1985-1994 ☐ (3)
1975-1984 ☐ (4)
1960-1974 ☐ (5)
1945-1959 ☐ (6)
1900-1944 ☐ (7)
Before 1944 ☐ (9)
Don't know ☐ (8)

27. What is the closest major intersection from your home with a stop light? _____ & _____

28. How many blocks is this intersection from your home? _____

29. Which of the following is the best description of the street that you live on?

Rural or county road ☐ (1)
Dead-end residential street ☐ (2)
Through residential street ☐ (3)
Commercial street ☐ (4)
Major highway ☐ (5)
Don't know ☐ (8)

30. When did you move into this home? ***(If you are not sure, feel free to ask other house members.)***

1995 to present ☐ (1)
1990 to 1994 ☐ (2)
1980 to1989 ☐ (3)
1970 to 1979 ☐ (4)
1960 to 1969 ☐ (5)
1959 or earlier ☐ (6)
Don't know ☐ (8)

31. In the past year has there been a major renovation to this house or apartment, such as adding a room, putting up or taking down a wall, replacing windows, or refinishing floors?
- ☐ (1) Yes - Give Date _____ *(month/year)*
- ☐ (2) No major renovations
- ☐ (8) Don't know

32. In the past year was the inside of your home painted?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 33)**
- ☐ (3) Don't know **(Go to Question 33)**

32.1. If Yes, when was it painted? _____/_____ (month/year)

32.2. How many rooms were painted? _____

33. In the past year was new carpeting (wall to wall) put in?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 34)**
- ☐ (3) Don't know **(Go to Question 34)**

33.1. If Yes, when was it installed? _____/_____ (month/year)

33.2. How many rooms have the new rug/carpet? _____

34. Is there a garage attached to this house or apartment?
- ☐ (1) Yes
- ☐ (2) No
- ☐ (8) Don't know

35. Can most of the windows in this home open?
- ☐ (1) Yes
- ☐ (2) No

36. Is air conditioning (refrigeration) used to cool your home?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 38)**

36.1 Which types of air conditioning do you use? ***(Select all that apply)***
- ☐ (1) Central unit
- ☐ (2) Portable unit(s)
- ☐ (3) Evaporated cooler
- ☐ (4) Window/wall unit(s) **(Go to Question 36.1.1)**
- ☐ (5) Other _____

36.1.1 *If you answered Window/Wall Unit above*, indicate the number of rooms & which rooms these units are used in.

Number of Rooms_____

Specify Rooms_____

37. Indicate how much you usually keep the air conditioner running to cool this house or apartment each month? ***(Indicate for each month with an X)***

	All of the Time	Most of the Time	Rarely	Never
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

38. Which fuels are used for heating your home?

- ☐ (01) Gas from underground pipes serving the neighborhood
- ☐ (02) Gas bottled or from a tank
- ☐ (03) Electricity
- ☐ (04) Fuel oil, kerosene, etc.
- ☐ (05) Coal or coke
- ☐ (06) Wood
- ☐ (07) Solar energy
- ☐ (08) Other fuel _____
- ☐ (09) No fuel or heating used **(Go to Question 42)**
- ☐ (88) Don't know

39. During which months do you usually keep the heating device running/on? (***Indicate for each month with an X***)

	All of the Time	Most of the Time	Rarely	Never
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

40. Do you use portable gas or kerosene heaters in this home?

- ☐ (1) Yes ***(Go to Question 40.1)***
- ☐ (2) No

40.1. How many Gas and/or Kerosene heaters did you use last year?

- ☐ (1) Gas _____
- ☐ (2) Kerosene _____

41. What fuel does your oven/stove use?

- ☐ (1) Electricity
- ☐ (2) Gas
- ☐ (3) Bottle gas
- ☐ (4) Other _____

42. Is a fireplace used in your home?

- ☐ (1) Yes ***(Go to Question 42.1)***
- ☐ (2) No ***(Go to Question 43)***

42.1 How many fireplaces? _____

42.2. During the heating season, how often is a fireplace used?

- ☐ (1) Less than once a **month**
- ☐ (2) 1 to 3 times per **month**
- ☐ (3) Once or twice a **week**
- ☐ (4) 3 to 5 times a **week**
- ☐ (5) More than 5 times a **week**

42.3. What is burned in the fireplace?

- ☐ (1) Wood
- ☐ (2) Artificial logs
- ☐ (3) Vented gas or flame
- ☐ (4) Other (e.g. unvented gas or coal) _____

43. Do you use any of the following products in your home? (***Indicate an X for each***)

	All of the Time	Most of the Time	Rarely	Never
Mothballs				
Deodorizers				
Room/air fresheners				
Scented candles				
Incense				
Other _____				

44. Are there drapes or curtains in any room in your home?

Yes ☐ (1)
No ☐ (2)

45. How often is your home sprayed for pest control?

Every 3 **months** ☐ (1)
Every 6 **months** ☐ (2)
Once a **year** ☐ (3)
Once every couple of **years** ☐ (4)
Never ☐ (5)

46. Are there large visible areas of mold, mildew, or recent water damage?

(Go to Question 46.1) Yes ☐ (1)
No ☐ (2)

46.1. If yes, where in your home?

_____

47. Do you ***currently*** have any of the following pets in your home? ***(Indicate Yes or No for each)***

	(1)Yes	(2) No
Dog	☐	☐
Cat	☐	☐
Other Pet	☐	☐

48. Have you ***ever*** lived with any of the following pets in your home? ***(Indicate Yes or No for each)***

	(1)Yes	(2) No
Dog	☐	☐
Cat	☐	☐
Other Pet	☐	☐

49. On how many days, on average, a week do you perform the follow tasks in your ***own home***? (***Indicate an X for each)***

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Bathroom				
Cleaning bathtub				
Cleaning shower				
Mopping floor				
Sweeping floor				
Stripping floor				
Waxing floor				
Cleaning sink				
Cleaning/polishing faucet				
Cleaning toilet				
Polishing metal				
Collecting trash				
Stain removal				
Cleaning the mirror				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Cleaning air vent				
Other				
Other				
Kitchen				
Stripping floor				
Waxing floor				
Sweeping floor				
Vacuuming floor				
Mopping floor				
Cleaning sink				
Polishing/cleaning faucet				
Collecting trash				
Spot/stain removal				
Cleaning oven				
Washing dishes				
Cleaning disposal				
Loading dishwasher				
Cleaning refrigerator				
Cleaning stove				
Cleaning microwave				
Cleaning stove hood/vent				
Other				
Other				
Bedrooms				
Bed making				
Vacuuming				
Mopping floor				
Sweeping floor				
Waxing floor				
Carpet cleaning/stain removal				
Collecting trash				
Dusting				
Washing windows				
Cleaning shutters/blinds				
Cleaning ceiling fan/s				
Cleaning walls/baseboards				
Other				
Living Areas				
Vacuuming floor				
Sweeping floor				
Carpet cleaning/stain removal				
Floor stripping				
Floor waxing				
Floor buffing				
Collecting trash				
Dusting furniture				
Washing windows				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Cleaning blinds/shutters				
Cleaning fans				
Cleaning fireplace				
Cleaning walls/ baseboards				
Cleaning/Changing lighting				
Cleaning doors/glass doors				
Other				
Utility Room				
Cleaning washer/dryer				
Wash clothes with machine				
Wash clothes by hand				
Folding laundry				
Sweeping floor				
Vacuuming floor				
Mopping floor				
Cleaning fan				
Other				

50. On how many **days a week** do you use the following cleaning products in ***your own home***? Please specify what type or brand of cleaner you use. (***Fill in name of product and indicate an X for how often used)***

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Decalcifiers				
Dishwashing Liquid/Soap				
All-purpose cleaners				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Floor Cleaner/Stripper				
Furniture oil/polish/Spray				
Germicidal/Disinfectant				
Glass cleaner/mirror cleaner				
Toilet bowl cleaner				
Oven Cleaner				
Sink/Counter/Tub Cleaner				

	Never	≤1 day/wk	2-3 days/wk	4-7 days/wk
Stain/Paint Remover				
51. On how many days, on average, a week do you use perfumed or scented cleaning products in your home?				

Section 3: Asthma Symptoms

52. Have you ever had trouble with your breathing?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 53)**
- ☐ (8) Don't know **(Go to Question 53)**

52.1. If Yes, what kind of trouble did you have?
- ☐ (1) Continuously, as if breathing is not quite right
- ☐ (2) Repeatedly, however gets completely better
- ☐ (3) Only rarely

52.2. If Yes, was this trouble with your breathing brought on by your work environment?
- ☐ (1) Yes
- ☐ (2) No
- ☐ (8) Don't know

53. Have you ever had asthma?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 54)**
- ☐ (8) Don't know **(Go to Question 54)**

53.1. If Yes, has your asthma been confirmed by a doctor?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 54)**
- ☐ (8) Don't know **(Go to Question 54)**

53.2. If Yes, at what age was your asthma confirmed by a doctor?
_____ yrs

54. Have you had an attack/episode of asthma in the last 12 months?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 55)**
- ☐ (8) Don't know **(Go to Question 55)**

54.1. If Yes, how many attacks of asthma have you had in the last 12 months?
_____attacks

54.2. Have you had an attack/episode of asthma while you were at work in the last 12 months?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 54.3)**
- ☐ (8) Don't know **(Go to Question 54.3)**

54.2.1 If Yes, do you know what triggered the LAST attack/episode of asthma while you were at work?
- ☐ (1) Yes
- ☐ (2) No **(Go to Question 54.3)**

54.2.1a. If Yes, what was the trigger?
_____

54.3. Have you had to miss any days of work due to asthma in the last 12 months?

☐ (1) Yes
☐ (2) No

54.3.1. If Yes, how many days of work did you have to miss due to asthma?

_____days

55. Are you currently taking any medications for asthma, including inhalers, aerosols or tablets?

☐ (1) Yes
☐ (2) No

56. Have you had ***wheezing or whistling*** in your chest at any time in the last 12 months?

☐ (1) Yes
☐ (2) No **(Go to Question 57)**
☐ (8) Don't know **(Go to Question 57)**

56.1. If Yes, have you had wheezing or whistling in your chest when you did not have a cold in the last 12 months?

☐ (1) Yes
☐ (2) No

56.2. Have you had wheezing or whistling in your chest while you were at ***home*** (indoors or outdoors) at any time in the last 12 months?

☐ (1) Yes
☐ (2) No

56.3. Have you had wheezing or whistling in your chest while you were at ***work*** at any time in the last 12 months?

☐ (1) Yes
☐ (2) No

56.4. While you were ***away from work*** at any time in the last 12 months, was your wheezing or whistling worse, better, or unchanged?

☐ (1) Worse
☐ (2) Better
☐ (3) Unchanged

56.5. After ***returning to your work*** at any time in the last 12 months, was your wheezing or whistling worse, better, or unchanged?

☐ (1) Worse
☐ (2) Better
☐ (3) Unchanged

56.6. If you were ***away from work for 5 or more*** consecutive days of absence at any time in the last 12 months, was your wheezing or whistling worse, better, or unchanged?

☐ (1) Worse
☐ (2) Better
☐ (3) Unchanged
☐ (8) Not Applicable

56.7. When ***you returned to your work after 5 or more consecutive days of absence*** at any time in the last 12 months, was your wheezing or whistling worse, better or unchanged?

☐ (1) Worse
☐ (2) Better
☐ (3) Unchanged
☐ (8) Not Applicable

56.8. Have you had to miss days of work due to wheezing or whistling at any time in the last 12 months?

☐ (1) Yes
☐ (2) No **(Go to Question 57)**

56.8.1. If Yes, how many days of work did you miss in the last 12 months?

_____ days

57. Have you had an attack/episode of shortness of breath at any time in the last 12 months?

- ☐ (1) Yes
- ☐ (2) No **(Go to Question 58)**
- ☐ (8) Don't know **(Go to Question 58)**

57.1. Have you had an attack/episode of shortness of breath that came on ***following strenuous activity*** at any time in the last 12 months?

- ☐ (1) Yes
- ☐ (2) No

57.2 Have you had an attack/episode of shortness of breath while you were at ***home*** (indoors or outdoors) at any time in the last 12 months?

- ☐ (1) Yes
- ☐ (2) No

57.3. Have you had an attack/episode of shortness of breath while you were ***at work*** at any time in the last 12 months?

- ☐ (1) Yes
- ☐ (2) No

57.4. While you were ***away from work*** at any time in the last 12 months, was your shortness of breath worse, better, or unchanged?

- ☐ (1) Worse
- ☐ (2) Better
- ☐ (3) Unchanged

57.5. After ***returning to your work*** at any time in the last 12 months, was your shortness of breath worse, better, or unchanged?

- ☐ (1) Worse
- ☐ (2) Better
- ☐ (3) Unchanged

57.6. If you were ***away from work for 5 or more consecutive days*** of absence at any time in the last 12 months, was your shortness of breath worse, better, or unchanged?

- ☐ (1) Worse
- ☐ (2) Better
- ☐ (3) Unchanged
- ☐ (8) Not Applicable

57.7. When you ***returned to your work after 5 or more consecutive days*** of absence at any time in the last 12 months, was your shortness of breath worse, better, or unchanged?

- ☐ (1) Worse
- ☐ (2) Better
- ☐ (3) Unchanged
- ☐ (8) Not Applicable

57.8. Have you had to ***miss days of work*** due to shortness of breath in the last 12 months?

- ☐ (1) Yes
- ☐ (2) No **(Go to Question 58)**

57.8.1. If Yes, how many days of work did you miss in the last 12 months?

_____ days

58. Have you been awakened during the night bay an attack/episode of any of the following symptoms in the last 12 months? ***(Indicate Yes or No for each)***

	(1)Yes	(2) No
Cough	☐	☐
Shortness of breath	☐	☐
Chest tightness	☐	☐

59. Have you ever had any of the following medical conditions? ***(Indicate Yes or No for each)***

	(1)Yes	(2) No
Nasal or sinus allergies, including hay fever	☐	☐
Exzema or any kind of skin allergy	☐	☐
Frequent heartburn	☐	☐
More than 6 respiratory infections in one year	☐	☐
Allergies to chemicals	☐	☐
Allergies to medicines	☐	☐
Allergies to animals	☐	☐
Allergies to dust or dust mite	☐	☐
Allergies to latex or latex-containing products ***(ace bandages/adhesive tape/condoms/gloves)***	☐	☐

60. When you are near **animals** (cats/dogs/horses) feathers (pillows/quilts/duvets) or in a **dusty** part of the house, do you ever:

	(1)Yes	(2) No
Get itchy or watery eyes?	☐	☐
Get a felling of tightness in your chest?	☐	☐

61. When you are near **trees, grass, or flowers**, or when there is a lot of **pollen** around, do you ever:

	(1)Yes	(2) No
Get itchy or watery eyes?	☐	☐

62. Have any of your **immediate family members** (parents/siblings/children) had any of the following medical conditions?

	(1)Yes	(2) No	(3) Don't Know
Asthma	☐	☐	☐
Hay fever, eczema, skin allergies	☐	☐	☐

Section 4: Demographic Information

63. Date of Birth: ____/____/____ (Month) (Day) (Year)

64. Gender:
Male ☐ (1)
Female ☐ (2)

65. Do you consider yourself Spanish/Hispanic/Latino? ***(Choose one answer)***
No, not Spanish/Hispanic/Latino ☐ (1)
Yes, Mexican, Mexican American, Chicano ☐ (2)
Yes, Puerto Rican ☐ (3)
Yes, Cuban ☐ (4)
Yes, other Spanish/Hispanic/Latino ☐ (5)

66. Which race do you consider yourself? ***(Choose one answer)***
White ☐ (1)
Black ☐ (2)
Asian, Asian-American or Pacific Islander ☐ (3)
American Indian or Alaska Native ☐ (4)
Another Race ☐ (5)

67. What is your standing height? Feet _____ Inches _____

68. How much do you weigh? _____Pounds

69. Have you smoked at least 100 cigarettes during your life?
Yes ☐ (1)
No ☐ (2)

70. Do you smoke cigarettes now?
Yes **(Go to Question 70. 1.1)** ☐ (1)
No ☐ (2)

71. 1.If yes, how many cigarettes do you smoke per day?
Less than ½ pack a day ☐ (1)
½ to 1 pack a day ☐ (2)
>1 to 2 packs a day ☐ (6)
>2 to 3 packs a day ☐ (4)
more than 3 packs a day ☐ (5)

72. What is the gross annual income for all family members in this household?
Less than $16,500 ☐ (1)
$16,500 - $24,999 ☐ (2)
$25,000 - $49,999 ☐ (3)
$50,000 - $74,000 ☐ (4)
$100,000 or more ☐ (5)
Don't know ☐ (8)
Wish not to answer ☐ (9)

73. Please provide your address and contact information:

Street Address _____ Apt. # _____

City _____ State _____ Zip _____

Telephone number (____)_____

Cell Phone number (____)_____

Form Approved Through 9/30/2007
OMB No. 0925-0001

Department of Health and Human Services

Final Invention Statement and Certification

(For Grant or Award)

DHHS Grant or Award No.

1 R03OH008136-01

A. We hereby certify that, to the best of our knowledge and belief, all inventions are listed below which were conceived and/or first actually reduced to practice during the course of work under the above-referenced DHHS grant or award for the period

9/1/2004 through 6/30/2007

original effective date *date of termination*

B. Inventions (Note: If no inventions have been made under the grant or award, insert the word *"NONE"* under Title below.)

NAME OF INVENTOR	TITLE OF INVENTION	DATE REPORTED TO DHHS
	NONE	
(Use continuation sheet if necessary)		

C. First Signature —The person responsible for the grant or award is required to sign (in ink). Sign in the block opposite the applicable type of grant or award.

TYPE OF GRANT OR AWARD	WHO MUST SIGN *(title)*	SIGNATURE
Research Grant 1 R03OH008136-01	Principal Investigator or Project Director Dr. Ahmed A Arif	
Health Services Grant	Director	
Research Career Program Award	Awardee	
All other types (*specify*):	Responsible Official	

D. Second Signature — This block ***must*** be signed by an official authorized to sign on behalf of the institution.

Title

Associate Vice President for Research

Typed Name

Barbara C. Pence, Ph.D.

Signature

Date

9/7/07

Name and Mailing Address of Institution

Texas Tech University Health Sciences Center
3601 4th Street, MS 6271
Lubbock, TX 79430

HHS 568 (Rev. 9/2004)