Adoption, Health Impact and Cost of Smoke-Free Multi-Unit Housing Policies

New

Supporting Statement

Part B – Collection of Information Employing Statistical Methods

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PART B. COLLECTION OF INFORMATION EMPLOYING STATISTICAL METHODS

B.1 Respondent Universe and Sampling Methods

B.1. A. LOS ANGELES COUNTY

The LA County data collection will employ statistical methods for sampling, weighting, and analysis and the procedures are detailed below.

Respondent Universe for Los Angeles County

SHS exposure in MUH is a critical public health concern in LA County, especially among African-American and Latino residents (13). Preliminary estimates from the 2007 Los Angeles County Health Survey (LACHS) indicate that these subgroups are disproportionately exposed to SHS. Specifically, among those living in MUH, the prevalence of SHS exposure was higher among African-Americans and Latinos than among Asian/Pacific Islanders and whites (13). African-Americans and Latinos are also more likely than Asian Pacific Islanders and whites to rent versus own their home (13). These data led to the decision to focus the LA County component of the Smoke-Free MUH Policy Study on MUH renters; hence condominium and townhome residents are excluded from the sample.

Another consideration in defining the target population was whether to sample MUH residents who are smokers, nonsmokers, or both (and by extension, limit data collection primarily to units where smoking is or is not permitted). Published literature indicates that the impact of regulatory tobacco control policies is greater among households with nonsmokers than smokers (7, 8). Therefore, for a fixed sample size, statistical power is enhanced by limiting the sample to primarily nonsmokers (an exception is being made to allow smokers who do not smoke in the unit or attached patio and balcony). The decision to focus primarily on nonsmokers is also consistent with the overarching goal of the study, which is to assess the health, social, and cost impact of smoke-free MUH policies on involuntary SHS exposure.

Description of Sampling Frame for Los Angeles County

The study team has begun to compile a comprehensive database identifying multi-unit residential properties (two or more housing units) in LA County using federal, county, and city data sources. This database will be refined in the next two months. Data were obtained primarily from the Los Angeles County Office of the Assessor, the LACDPH's Environmental Health Program, the U.S. Department of Housing and Urban Development, the Housing Authority of the County of Los Angeles, and locally subsidized housing programs. In addition to identifying multi-unit residential properties, the LA County database includes the following information: site address; property owner's name and mailing address; property manager's or other agent of the owner's name and contact information (if applicable); property information including year built, number of buildings (if applicable), number of units per building, a legal description of the property; reappraisal year, and type of rental property (i.e., market-rate rental units or subsidized housing units).

Data from the Office of the Assessor provides the most comprehensive data regarding MUH properties. State law mandates that all property is subject to taxation based on the assessed value of the property, unless otherwise exempted. The Office of the Assessor maintains assessment records of properties in the County of Los Angeles and is responsible for locating all taxable properties and identifying ownership, establishing a taxable value for all properties, completing an assessment roll showing the assessed values of all properties, and applying all legal exemptions. LACDPH, through significant in-kind staff contributions, obtained preliminary data from the Department's Environmental Health (EH) Program to supplement data obtained from the Office of the Assessor. This enabled the study team to prepare the preliminary sampling design in the next section of this document.

To collect comprehensive information on subsidized housing, the study team, working with other LACDPH staff, obtained LA County data from the U.S. Department of Housing and Urban Development (HUD), the Housing Authority of the County of Los Angeles (HACoLA), and individual cities. HUD administers federal aid to local housing authorities to manage housing for residents through two main types of subsidized housing programs: public housing and housing choice vouchers (Section 8). These forms of rental assistance allow eligible low-income families, the elderly, and persons with disabilities to find affordable housing that is available in all sizes and types. The listing from HUD provides the property's address; the name and contact information of the property management company that oversees individual properties; and whether the residential units are reserved for low-income families, the elderly, or disabled. The listing from HACoLA includes the name and location of the public housing site; the number of units reserved for the elderly or for families; and the type of public housing programs available (e.g., public housing and Section 8 housing choice voucher program). Data obtained from each of the intervention and control cities include the name and address of these properties as well as the type of subsidized housing program available for residents.

Rationale for Selection of Intervention and Control Cities in Los Angeles County

A quasi-experimental baseline and follow-up control group design will be used to study the health, social, and cost impact of adoption and implementation of regulatory MUH policies to reduce exposure to SHS in LA County. A sample of 500 MUH residents and 130 MUH Operators will be selected from intervention cities with regulatory MUH policies and a comparable sample of 500 MUH residents and 130 MUH operators will be selected from control cities without regulatory MUH policies. This initial selection of cities, described below, is subject to change, depending on the individual city's progress in adopting regulatory smoke-free MUH policies by mid-2012. The size of the samples will not change even if other cities are ultimately selected.

1) Intervention Cities Selection criteria

We plan to select up to twelve cities in Los Angeles County with active MUH policy campaigns and at least 20% of residents living in rental units for this study because they will most likely adopt an MUH policy during the course of the study. The initial selection of cities, described below, is subject to change, depending on the individual city's progress in adopting regulatory smoke-free MUH policies in 2012. The size of the samples will not change even if other cities are ultimately selected. At this time, we expect the intervention cities to include Sierra Madre, Lawndale, Culver City, El Monte, Artesia, San Fernando, San Gabriel, Hawthorne, Carson,

Huntington Park, South Pasadena, and Compton. See Table 1 for a list of the intervention cities and their campaign status. Special emphasis was also placed on selecting intervention cities with ethnically diverse populations and substantial health disparities.

Table 1. Intervention Cities		
Intervention city name	**MUH policy campaign status***	**Expected policy adoption date**
Culver City	In phase 4 - Try to identify champion, build coalition, public comments	2012
Lawndale	In phase 2 – Recruit coalition	2012
Sierra Madre	In phase 4 - Look for champion	2012
San Fernando	In phase 4 – implement the campaign	2012
San Gabriel	In phase 2 – Recruit coalition, conduct presentation	2012
Carson	In phase 3 - outreach	2012
Artesia	In phase 3 – build coalition, conduct public comments in Jun	2012
Hawthorne	In phase 1 - educate the public on MUH	2012
El Monte	Not started	
Compton	In phase 5 – policy implementation	Oct 2011 (in effect on Jan 2013)
Huntington Park	In phase 5 – policy implementation	Feb 2012 (in effect on Jul 2013)
South Pasadena	In phase 5 – policy implementation	Aug 2010 (in effect on Jan 2013)

*MUH Policy Campaign Status is based on a Policy Adoption and Implementation Model that separates the policy adoption and implementation process into five phases: community assessment (phase 1), policy campaign strategy (phase 2), coalition building (phase 3), implementation of policy campaign and adoption of the policy (phase 4), and policy implementation and enforcement (phase 5).

2) Comparison (Control) Cities Selection Criteria

We plan to select up to twelve cities in Los Angeles County as control cities for this study. In contrast to the intervention cities, control cities must not have an active smoke-free MUH policy campaign or an existing regulatory smoke-free MUH policy. Control cities were identified and paired with an intervention city based on comparable characteristics and prioritized according to the following factors: previous policy adoption (e.g., treatment and control cities previously adopted smoke-free parks policies); percent of housing units occupied by renters; and median household income (see Table 2 for intervention and **control** city characteristics). The final decision about intervention and control cities will be made in 2012. The proposed comparison

cities may include: Lomita, Lynwood, Monrovia, Montebello, Alhambra, LaPuente, Monterey Park, Inglewood, Gardena, Maywood, El Segundo, and South Gate.

Table 2. Intervention and Control City Characteristics

Type	City	Tobacco Policies*	Agency	Percent of Housing Units Occupied by Renters	Median house-hold income	Hispanic Pop^{n}	White Pop^{n}	Black Pop^{n}	Asian Pop^{n}	Total Pop^{n}	City size (sq. mile)
I	Sierra Madre	TRL, Dining	Day One	38.2%	82,675	14.9%	72.3%	1.7%	7.5%	10,917	2.96
C	Lomita	TRL, Park		53.7%	62,464	32.8%	43.4%	4.8%	14.1%	20,256	1.92
I	Lawndale	TRL	SAFE	65.6%	48,357	61.0%	16.2%	9.3%	9.6%	32,769	1.97
C	Lynwood	TRL, Park		53.5%	43,654	86.6%	2.2%	9.7%	0.6%	69,772	4.84
I	Culver City	TRL, Park, Dining	FAME	45.7%	72,199	23.2%	48.0%	9.2%	14.5%	38,883	5.14
C	Monrovia	Park		50.5%	65,477	38.4%	41.1%	6.4%	10.9%	36,590	13.75
I	El Monte	TRL, Park	CMT	57.8%	41,948	69.0%	4.9%	0.4%	24.9%	113,475	9.62
C	Montebello	TRL		53.9%	50,881	79.3%	8.5%	0.6%	10.6%	62,500	8.37
I	Artesia	TRL	PCore	44.4%	50,777	35.8%	21.3%	3.3%	36.9%	16,522	1.62
C	Alhambra	Park		59.2%	51,527	34.4%	10.0%	1.3%	52.5%	83,089	7.63
I	San Fernando	TRL, Park	SAFE	45.5%	49,716	92.5%	5.3%	0.6%	0.8%	23,645	2.37
C	La Puente	Park		39.8%	61,108	85.1%	4.6%	1.1%	8.2%	39,816	3.47
I	San Gabriel	TRL, Park	Day One	50.8%	55,326	25.7%	11.4%	0.8%	60.4%	39,718	4.13
C	Monterey Park	TRL, Park		44.6%	52,159	26.9%	5.0%	0.3%	66.3%	60,269	7.74
I	Hawthorne	TRL, Park	SAFE	73.2%	44,469	52.9%	10.3%	26.8%	6.5%	84,293	6.08
C	Inglewood	TRL, Park		63.0%	43,460	50.6%	2.9%	42.9%	1.3%	109,673	9.10
I	Carson	TRL, OA	FAME	23.2%	68,425	38.6%	7.7%	23.3%	25.2%	91,714	18.94
C	Gardena	TRL, Park		52.1%	46,837	37.7%	9.3%	23.9%	25.8%	58,829	5.86
I	Huntington Park	Park, OA	CMT	73.0%	36,561	97.1%	1.6%	0.6%	0.4%	58,114	3.01
C	Maywood	Park		69.8%	37,974	97.4%	1.8%	0.2%	0.2%	27,395	1.18
I	South Pasadena	OA	SAFE	54.3%	80,412	18.6%	54.3%	3.0%	31.1%	25,619	3.41
C	El Segundo	TRL, Beach		57.2%	87,630	15.7%	59.1%	1.9%	8.6%	16,654	5.44
I	Compton	TRL, OA	CMT	44.8%	43,728	65.0%	0.8%	32.1%	0.2%	96,455	10.1
C	South Gate	Park		54.2%	42,556	94.8%	3.4%	0.6%	0.7%	94,396	7.35

I = Intervention

C=Control

* Dining refers to smoke-free outdoor dining policies; TRL refers to tobacco retailer licensing policies; and Park refers to smoke-free park(s) policies.

Description of Sampling Design for Los Angeles County

Respondent Universe

The respondent universe for the proposed study will include both operators of MUH complexes as well as occupants of eligible units within these MUH complexes; 130 MUH operators and 500 MUH residents will be selected from housing complexes in each study condition (intervention and control cities). To be eligible for the study, an individual unit within a MUH complex must (a) be occupied and (b) not allow anyone to smoke in the unit during the data collection period. For the purposes of this initial study plan, a total of 18 cities in LA County were purposively selected for the study to represent a diverse range of study conditions. One-to-one matching (i.e., one intervention city will be matched to one control city) is used to increase equivalency of the intervention and control cities. The primary city-level matching variables include previous policy adoption (e.g., treatment and control cities previously adopted smoke-free parks policies); percent of housing units occupied by renters; and median household income. Secondary matching variables include city-level race/ethnicity; population size and city size; and number and type of MUH complexes. The list in Table 2 is preliminary and subject to modification because a proposed intervention site will be replaced if the planned anti-smoking regulations become law and have begun to be implemented before the baseline data collection period. Table 3 provides counts of MUH complexes and are intended to illustrate the rough orders of magnitude of the size of the populations to be covered in the study.

Sampling Design

Within each of the selected cities, a multistage cluster probability sampling design will be used to randomly select MUH complexes and units within complexes. For illustrative purposes, the target numbers of cooperating MUH complexes (i.e., the final numbers of completed interviews with MUH operators after losses due to nonresponse) are shown in Table 4 for each proposed city within study condition. The target sample sizes are proportional to the number of MUH units in a city under a particular study condition. Such an allocation is approximately optimal for estimating outcomes that are aggregated across all cities within a study condition. The sample sizes for each city are generally too small to provide reliable city-specific estimates. The goal will be to obtain completed interviews with 130 MUH operators per study condition (corresponding to a total sample size of 260 MUH complexes).

For each of the selected cities, the sampling frame of MUH complexes will be constructed as follows. At stage 1, the primary stratification of MUH complexes will be by size of MUH defined in terms of the number of units in the complex. Stratification by size of MUH will used because it has been found to be associated with SHS exposure. For example, the 2007 Los Angeles County Health Survey (a random digit-dial telephone survey of approximately 1,000 randomly selected households) found that a significantly higher proportion of households in MUH complexes with 16 units or more (12.0%) were exposed to SHS in comparison to households in MUH complexes with 15 units or less (4.4%) (14) The use of a MUH complex

unit size stratification variable that is highly correlated with SHS exposure can be effective in reducing sample variance as well as ensuring better representativeness of the sample. Moreover, stratification by size will be important in developing an efficient sample allocation because there is variability at the city level in the distribution of MUH complexes by size (e.g., see Table 3). While the definition of the size classes to be used for stratification remains to be determined, we expect that specifying three or four sizes (with a separate stratum for very small MUHs) will be sufficient to ensure a more nearly optimum allocation of the sample MUH complexes to strata. To the extent feasible, variables such as market-based vs. subsidized housing may be used to sort MUHs prior to sampling to induce additional implicit stratification.

After stratification of the MUH complexes into appropriate size classes, a probability proportional to size (PPS) sample of complexes will be selected from each of the nine proposed intervention and nine proposed control cities to reach the targeted sample size (before considering nonresponse rate—see below) of 130 complexes per study condition. For example, assuming that 75% of MUH operators will agree to participate in the study, a total of 173 MUH complexes per condition would have to be sampled. The operators of the selected MUH complexes will be contacted for interview and asked to provide detailed listings of the nonvacant units in their complex for subsequent sampling purposes (see Section B.2, Procedures for Data Collection).

At stage 2 of sampling, a specified number of units will be selected from the lists of nonvacant units provided by the MUH operator. We expect that the number of units to be sampled per complex will vary from 2 to 8 depending on the size of the complex. The goal will be to obtain completed interviews resident surveys in 500 MUH units per study condition (1,000 total MUH units). In order to obtain these numbers, a much larger sample size must be selected to compensate for losses due to smoker status (households that allow smoking are ineligible for the study) as well as survey nonresponse (refusal, unavailable during field period, etc.). Thus, for example, assuming that 25% of units allow smoking and 80% of the remaining units agree to participate in the study, a total of 833 units per study condition must initially be selected for the sample. Table 4 summarizes the allocation of the sample of MUH operators and corresponding sample units under the above assumptions.

After selection of the units, the adult in each household with the most recent birthday will be selected for enrollment in the study (**pages 4-6 of Attachment 8A** and study eligibility criteria in Section B.2, Procedures for Data Collection). After enrollment of the adult resident participant, we will then ask if there are children under 18 in the home and if the adult with the most recent birthday is their parent or caregiver. If they are not the parent or caregiver, the adult is interviewed for the household but is not asked to respond to the questions related to the children; he/she is then asked for the saliva sample (**Attachments 10A and 10A-1**). Next, we ask to speak with the parent/guardian to respond to the questions that pertain to the children (**Attachment 8A-3**). The child over age two with the most recent birthday is asked for the saliva sample (**Attachments 10A-1** assent and **8A-3** consent procedures will be rigorously followed). Alternatively, if the adult is the parent or caregiver, he/she is asked the entire questionnaire (including the child-related questions); asked to give saliva sample; and the child over age two with the most recent birthday is also asked for the saliva sample (**Attachments 8A-1 and 8A-3**).

Among the MUH complexes agreeing to participate in the study and meeting the eligibility criteria, a random sample will be selected for the airborne particle monitoring assessment (see B.2 Airborne Particle Monitoring for details). One hundred complexes in the intervention and control study conditions (200 total) will be selected for participation in the airborne particle monitoring assessment.

Table 3. Estimates of the number of MUH complexes and housing-related statistics by city and condition

Type*	City	No. MUH Units	Percentage of Duplexes	Percentage of Triplexes	Percentage of Fourplexes	Percentage of 5 units of more
I1	Sierra Madre	198	25.76%	17.17%	13.13%	43.94%
I2	Lawndale	730	46.16%	18.77%	13.70%	21.37%
I3	Culver City	1,174	41.91%	15.42%	23.51%	19.17%
I4	El Monte	1,332	17.64%	16.97%	19.52%	45.87%
I5	Artesia	155	12.90%	25.16%	30.97%	30.97%
I6	San Fernando	296	33.11%	22.30%	18.92%	25.68%
I7	San Gabriel	762	17.19%	15.55%	14.44%	48.82%
I8	Hawthorne	2,321	10.17%	28.13%	17.49%	44.21%
I9	Carson	348	41.09%	21.26%	11.21%	26.44%
I10	Huntington Park	1,761	15.45%	27.14%	19.36%	38.05%
I11	South Pasadena	771	29.31%	11.15%	17.64%	41.89%
I12	Compton	1,624	37.68%	18.60%	22.23%	24.49%
	All intervention sites	0	24.87%	21.14%	18.82%	35.17%
C1	Lomita	429	25.64%	26.34%	15.62%	32.40%
C2	Lynwood	1,123	21.91%	22.53%	23.33%	32.24%
C3	Monrovia	894	36.24%	19.13%	15.66%	28.97%
C4	Montebello	1,291	21.38%	17.97%	31.22%	29.43%
C5	Alhambra	2,634	23.73%	24.53%	15.41%	36.33%
C6	La Puente	233	18.03%	7.30%	27.90%	46.78%
C7	Monterey Park	894	25.91%	22.56%	16.06%	35.47%
C8	Inglewood	3,648	20.37%	20.12%	18.17%	41.34%
C9	Gardena	1,640	15.82%	18.63%	28.97%	36.58%
C10	Maywood	759	11.46%	39.26%	20.55%	28.72%
C11	El Segundo	538	11.90%	13.38%	19.52%	55.20%
C12	South Gate	2,080	18.51%	30.77%	22.60%	28.13%
	All control sites	16,073	21.08%	22.83%	20.64%	35.44%
	Grand total	27,545	22.66%	22.13%	19.88%	35.33%

*Prefix indicates type (I = intervention; C = control). Suffix indicates matched pairs.

Data obtained from Los Angeles County Office of the Assessor.

Table 4. Illustrative sample sizes under proposed design – Note that this table includes some cities that are no longer included in the proposed control group

Type*	City	No. MUH Complexes	No. MUH complexes to be sampled	Target no. MUH (operator) interviews	Target no. occupant (unit) interviews	No. units to be sampled before losses	Avg. no. units to be sampled per MUH†
I1	Sierra Madre	339	5	4	14	23	6.41
I2	Lawndale	2,281	17	13	49	82	6.41
I3	Culver City	1,499	20	15	59	98	6.41
I4	Huntington Park	2,919	30	22	86	143	6.41
I5	Artesia	256	5	4	15	26	6.41
I6	San Fernando	499	7	6	21	36	6.41
I7	San Gabriel	1,404	18	13	51	85	6.41
I8	Hawthorne	3,250	55	41	159	265	6.41
I9	Carson	574	16	12	45	76	6.41
	All intervention sites	*13,021*	*173*	*130*	*500*	*833*	*6.41*
C1	Temple City	962	10	7	28	47	6.41
C2	Hawaiian Gardens	448	5	4	15	24	6.41
C3	Monrovia	1,620	16	12	47	78	6.41
C4	Maywood	1,332	11	8	31	52	6.41
C5	Alhambra	3,690	40	30	115	192	6.41
C6	La Puente	567	9	7	26	43	6.41
C7	Monterey Park	1,446	21	15	59	99	6.41
C8	Inglewood	5,474	54	41	157	261	6.41
C9	San Dimas	192	8	6	22	37	6.41
	All control sites	*15,731*	*173*	*130*	*500*	*833*	*6.41*
	GRAND TOTAL	*28,752*	*347*	*260*	*1,000*	*1,667*	*6.41*

*Prefix indicates type (I = intervention; C = control). Suffix identifies matched pairs.

†The numbers of units to be sampled will vary from 2 to 8 per complex depending on the size of the complex.

Statistical Power

The LA County component of this study will sample 130 MUH operators and 500 residents in each study condition, for a total of 260 MUH operators and 1,000 residents each studied at two time intervals approximately nine months apart. One hundred airborne particle monitoring assessments in MUH complexes will also be conducted per study condition, for a total of 200 assessments at two time intervals.

The calculation of statistical power requires estimating the probability of correctly rejecting a null hypothesis (i.e., no changes in health, social, or cost impact of locally adopted smoke-free MUH ordinances in intervention cities relative to the control cities without locally adopted smoke-free MUH ordinances) that is false. Power is numerically defined as 1-β, where β is the Type II error rate. Statistical power is also related implicitly to the Type I error rate (α), referred to as a "significance or alpha level" of a hypothesis test. Statistical power is typically computed during the sampling design phase of a study to ensure that there is sufficient power (i.e., 0.70 to 0.90) and the numerical quantities used in the calculations, such as the size of the intervention effect divided by the standard deviation for variables of interest (i.e., effect size), are taken from previous studies and/or published data from comparable studies.

Unfortunately, a comprehensive literature review failed to identify a single published study focused on MUH residents or operators based on an experimental or quasi-experimental research design (i.e., pretest/posttest changes in health, social, or cost resulting from the implementation of locally adopted smoke-free MUH ordinances in intervention relative to control study condition). Therefore, the numerical quantities needed to directly calculate statistical power, effects and standard deviations, are not available.

The literature review did reveal several "impact" studies among MUH residents of enclosed public places policies based on repeated cross-sectional designs, and one cross-sectional operator survey assessing perceived barriers and motivators of MUH policies as well as other MUH policy indicators. The magnitude of the effects of tobacco control policies from prior published studies are listed in **Attachment 3A**. Among these studies, statistical power was calculated for several key outcomes measures, including adult salivary cotinine, child salivary cotinine, $PM_{2.5}$ particle count, and perceived barriers and motivators of MUH policies. A summary of each power calculation is presented below:

- Adult salivary cotinine (7)—statistical power (1-β) is estimated to be greater than 99% based on a Type I error rate (α) = 0.05; two-sided paired t-test of mean difference with intervention condition mean = 0.35 ng/ml and control condition mean = 0.18 ng/ml; standard deviation of difference = 0.89; effect size = 0.19; and n = 500.

- Child salivary cotinine (8)—statistical power (1-β) is estimated to be approximately 85% based on a Type I error rate (α) = 0.05; two-sided paired t-test

of mean difference with intervention condition mean = 0.14 ng/ml and control condition mean = 0.07 ng/ml; standard deviation of difference = 0.36; effect size = 0.19; and n = 250.

- $PM_{2.5}$ particle count (15)—statistical power (1-β) is estimated to be approximately 80% based on a Type I error rate (α) = 0.05; two-sided paired t-test of mean difference with intervention condition mean = 119 mg/m^3 and control condition mean = 38 mg/m^3; standard deviation of difference = 287; effect size = 0.28; and n = 100.

- Perceived barriers and motivators (12)—statistical power (1-β) is estimated to be approximately 85% based on a Type I error rate (α) = 0.05; McNemar's test of equality of paired proportions with difference in proportions = 0.05; proportion of discordant pairs = 0.080; and number of pairs = 260.

Given the lack of comparable data for the MUH operators, we must estimate the power for the number of operators selected for study. A sample size of 130 for the MUH operators in each of the two study conditions yields a power of 80% and a 95% confidence level if the assumed percentage is 50% for one condition and 65% for the second condition.

Based on these calculations, we have concluded that the proposed sample size of 500 residents, 100 airborne particle monitoring, and 130 operator surveys per study condition will be sufficient to achieve at least 80% power or greater for key outcome measures of the study. As noted above, the above calculations were based primarily on effect sizes of policies that prohibited smoking in enclosed public places and workplaces. No published studies are available to provide estimates of effect sizes for MUH policies, either voluntary or regulatory. However, the available studies are based on repeated cross-sectional research designs as opposed to the longitudinal design of the current study. Longitudinal designs offer increased statistical power due to smaller standard errors as well as the capability to assess within subject (i.e., individuals and MUH complexes) change, unlike repeated cross-sectional designs. These considerations, taken together with the preliminary statistical power calculations, suggest that the current study will be able to detect the health, social, and cost impact of the regulatory MUH policies of interest for residents and operators.

B.1.B MINNESOTA, MAINE, AND FLORIDA

The second and more limited component of the study will focus on MUH in Maine, Minnesota, and Florida, states that have already adopted and broadly implemented MUH policies to protect residents from the ill effects of exposure to SHS in their housing units either as a response to local regulations or voluntarily. Minnesota, Maine, and Florida have been added to the policy component of this research in order to expand the generalizability of conclusions made regarding adoption and implementation of smoke-free policies in MUH. Results from studies in these three geographic areas, along with results from cities in LA County, can more readily be interpreted at a national population level than could results from LA County alone. With an overall objective of national applicability, and in order to complement the one already established study site (LA County), these three specific states were chosen with the following rationale:

1. All three states have adopted state-level regulatory policies in restaurants, work places, and public spaces.

2. All three states have an active base of smoke-free advocates and researchers.

3. Minnesota and Maine have given priority to the adoption and implementation of smoke-free housing policies. Both states maintain state-level registries of smoke-free units, and both have legislative power to regulate smoke-free policies in MUH at the state or local level.

4. Florida is prohibited from adopting local regulatory smoke-free MUH ordinances by state preemption of this authority. Thus, local smoke-free MUH policies in Florida are currently on a voluntary level at the discretion of the property owner/management. In addition, the City of Orlando is currently attempting to overturn this state preemption, which will help us better understand the challenges faced to local regulatory action on smoking.

Respondent Universe and Sampling Design

The Minnesota, Maine, and Florida data collection will involve convenience samples in selected cities. The final cities or counties selected will be determined in the spring of 2012. However, as Table 5 illustrates, the cities proposed in Minnesota, Maine, and Florida are not atypical of residents of MUH complexes nationally.

TABLE 5. State and City Comparisons for Proposed Focus Group Locations

Indicator	Florida	Maine	Minnesota	United States
Total Population	**18,801,310**	**1,328,361**	**5,303,925**	**308,745,538**
% Female	51.1%	51.1%	50.4%	**50.8%**
Age (% of total population)				
< 20 years	23.9%	23.3%	26.9%	**26.9%**
20 - 39 years	25.0%	22.9%	26.4%	**27.8%**
40 - 59 years	27.7%	31.1%	28.6%	**27.8%**
60 - 79 years	18.5%	18.1%	14.3%	**14.8%**
> 80 years	4.9%	4.5%	3.9%	**3.7%**
Race/Ethnicity (% of total population)				
White	75.0%	95.2%	85.3%	**72.4%**
Black or African American	16.0%	1.2%	5.2%	**12.6%**
Asian	2.4%	1.0%	4.0%	**4.8%**
Two or More Races	2.5%	1.6%	2.4%	**2.9%**
Hispanic or Latino	22.5%	1.3%	4.7%	**16.3%**
Economic Data*				
Median household income	$44,409	$45,815	$55,459	**$50,046**
% of individuals below poverty level	16.5%	12.9%	11.6%	**15.3%**
Unemployment rate, August 2011	10.7%	7.6%	7.2%	**9.1%**
Educational Data (% of total				

population 25 years or older)*				
Did not graduate high school	14.5%	9.7%	8.2%	**14.4%**
High school diploma	51.1%	54.5%	50.0%	**49.8%**
College degree or higher	34.4%	35.8%	41.8%	**35.7%**
Households by Type (% of total population)				
With individuals < 18 years	29.8%	27.8%	31.6%	**33.4%**
With individuals > 65 years	31.4%	27.1%	22.8%	**24.9%**
Housing Occupancy				
% Owner-occupied units	67.4%	71.3%	73.0%	**65.1%**
% Renter-occupied units	32.6%	28.7%	27.0%	**34.9%**
% Vacant rental units	13.2%	8.9%	7.8%	**8.2%**
% Receiving housing assistance**	2.1%	3.5%	3.0%	**3.1%**
Number of Public Housing Authority Units	193,782	26,971	92,358	**5,063,071**
Risk Factor Data***				
Never Smoker	53.0%	51.6%	59.2%	**56.0%**
Former Smoker	29.8%	30.2%	25.9%	**25.2%**
Current Smoker	17.2%	18.2%	14.9%	**17.2%**

Sources: 2010 Census FactFinder
* 2010 American Community Survey
**Calculated from 2008 HUD assistance data and 2010 total population

*** 2010 BRFSS

Indicator	Tallahassee, FL	Orlando, FL	Auburn, ME	Portland, ME	Waterville, ME	Minneapolis, MN	St. Paul, MN	United States
Total Population	**181,376**	**238,300**	**23,055**	**66,194**	**15,722**	**382,578**	**285,068**	**308,745,538**
% Female	52.9%	51.4%	51.7%	51.2%	53.2%	49.7%	51.1%	**50.8%**
Age (% of total population)								
< 20 years	25.9%	24.5%	24.7%	19.4%	24.0%	23.9%	29.0%	**26.9%**
20 - 39 years	42.9%	37.5%	25.4%	35.3%	29.2%	39.8%	33.4%	**27.8%**
40 - 59 years	19.0%	24.8%	28.9%	27.7%	24.8%	24.2%	24.4%	**27.8%**
60 - 79 years	9.7%	10.7%	15.4%	13.1%	15.0%	9.8%	10.4%	**14.8%**
> 80 years	2.4%	2.7%	5.6%	4.5%	6.8%	2.6%	2.9%	**3.7%**
Race/Ethnicity (% of total population)								
White	57.4%	57.6%	93.7%	85.0%	93.9%	63.8%	60.1%	**72.4%**
Black or African American	35.0%	28.1%	2.5%	7.1%	1.1%	18.6%	15.7%	**12.6%**
Asian	3.7%	3.8%	0.9%	3.5%	1.2%	5.6%	15.0%	**4.8%**
Two or More Races	2.3%	3.4%	2.1%	2.7%	2.4%	4.4%	4.2%	**2.9%**
Hispanic or Latino	6.3%	25.4%	1.5%	3.0%	2.4%	10.5%	9.6%	**16.3%**

Economic Data*								
Median household income	$35,911	$38,098	$39,818	$45,525	$31,633	$46,508	$44,057	**$50,046**
% of individuals below poverty level	34.4%	18.5%	14.7%	18.3%	24.3%	23.3%	24.2%	**15.3%**
Unemployment rate, August 2011	8.8%	10.2%	6.8%	5.4%	7.1%	7.1%	7.8%	**9.1%**
Educational Data (% of total population 25 years or older)*								
Did not graduate high school	6.5%	11.8%	13.5%	7.4%	13.2%	10.8%	14.6%	**15.4%**
High school diploma or some college	36.9%	47.7%	52.0%	38.3%	56.2%	37.7%	43.8%	**57.1%**
College degree or higher	56.6%	40.6%	34.3%	54.3%	30.6%	51.6%	41.6%	**27.5%**
Households by Type (% of total population)								
With individuals < 18 years	23.5%	28.5%	29.1%	20.7%	24.8%	23.5%	30.4%	**33.4%**
With	15.0%	16.8%	26.0%	20.3%	28.5%	14.1%	17.4%	**24.9%**

individuals > 65 years								
Housing Occupancy								
Owner-occupied units	41.4%	39.5%	57.3%	42.7%	47.8%	49.2%	51.3%	**65.1%**
Renter-occupied units	58.6%	60.5%	42.7%	57.3%	52.2%	50.8%	48.7%	**34.9%**
% Vacant rental units	11.6%	14.0%	8.2%	5.6%	9.4%	7.1%	7.2%	**8.2%**
% Receiving housing assistance**	4.3%	4.4%	6.9%	9.6%	7.0%	3.5%	7.0%	**3.1%**
Number of Public Housing Authority Units	2,582	4,220	774	2,864	588	11,122	8,282	**5,063,071**
Risk Factor Data (MSA)***	**Tallahassee**	**Orlando-Kissimmee**	**Lewiston-Auburn**	**Portland-South Portland-Biddeford**	**Augusta-Waterville**	**Minneapolis-St. Paul-Bloomington**		
Never Smoker	63.1%	60.0%	53.9%	52.8%	52.3%	59.6%		**56.0%**
Former Smoker	19.8%	24.1%	32.3%	30.0%	27.0%	25.2%		**25.2%**
Current Smoker	17.2%	15.9%	13.7%	17.2%	20.7%	15.2%		**17.2%**

Sources: 2010 Census FactFinder
* 2010 American Community Survey. NB: 2010 data are not yet available for Auburn and Waterville, ME. Data for these cities a
2005-2009 ACS 5-year estimates

**Calculated from 2008 HUD assistance data and 2010 total population
*** 2010 BRFSS

B.2 Procedures for the Collection of Information

Attachment 3C provides a flow chart for collection and analysis of MUH Operator and Resident Surveys, cotinine and Indoor Air Quality samples, and focus groups. Weighting procedures for the LA County data are addressed in B.3 below. See **Attachment 3D** for the study logic model.

B.2.1 Operator and Resident Surveys Overview

MUH operators in the selected LA County intervention and comparison cities will first be screened for participation through a telephone screening interview. Operators will be interviewed twice, approximately nine months apart (described hereafter as Baseline and Post-Intervention data collection) in person by LA County –based Field Data Collectors hired and trained by the study team. The Post-Intervention version of the LA County MUH Operator survey will be a minimally modified version of the Phase 1 (Baseline) survey. Operators selected in Maine, Minnesota, and Florida will be interviewed using the same Baseline questionnaire and following the same procedures as in LA County.

A randomly selected group of **residents** from the LA County MUH complexes whose operators were interviewed in the intervention and comparison groups will be recruited to participate in the MUH Resident Survey, cotinine and IAQ monitoring. Respondents will first be screened in person by bilingual LA County–based Field Data Collectors hired and trained by the study team. Only residents who report that they do not smoke in their apartments or allow others to do so will be eligible for the study. After completing the consent process, the adult with the most recent birthday will be interviewed face-to-face about his/her attitudes, beliefs, health and smoking experiences, exposure to secondhand smoke, and knowledge of the apartment complex's policies to protect residents from the ill effects of exposure to SHS in their housing units. If there are children in the home, and the respondent is not the parent/guardian/foster parent/primary caregiver, the adult in the home that fulfills that role will be asked to complete a consent and to report on the health and smoking exposures of the children in the home. As with the MUH Operator Survey, Post-Intervention of the LA MUH Resident Survey will be a modification of the Baseline survey. A randomly selected adult and a randomly selected child will also be asked to provide a saliva sample to analyze for the presence of cotinine. A subset of the resident units in the intervention and comparison groups will be enrolled in a seven-day indoor air monitoring protocol to assess secondhand smoke exposure in the units.

The resident interviews, cotinine samples, and air monitoring will be repeated approximately nine months later. In the third year of the project, we will conduct a secondary analysis of de-identified self-reported resident health-related data in comparison to other available datasets in LA County to assess costs and benefits of the intervention. We will also conduct secondary analysis using de-identified MUH operator data on costs of implementation and compare it to other available cost data.

B.2.2 MUH Operator Surveys will be conducted in English (**Attachments 6A [Baseline] and 7A [Post-Intervention]**).

Who Collects the Data: In LA County, survey data will be collected by Solutions Field Data Collectors and Westat Field Data Collector Supervisor hired from LA County. Data entry, cleanup and weighting are done by Westat, which transmits data to LACDPH for analysis. In Maine, Florida, Minnesota survey data will be collected by Healthy Housing Solutions and Westat senior project team members; data to be analyzed by Healthy Housing Solutions.

Frequency: 1) LA County: Interviewed twice; 2) Maine, Minnesota, and Florida: interviewed one time.

Purpose: We will conduct face-to-face interviews in English with MUH operators in all locations listed above. We estimate this will take approximate 45 minutes per interview and an additional 30 minutes for the visual assessment of the complex.
The overall goal of this data collection is to learn more about how apartment managers put policies to protect residents from the ill effects of exposure to SHS in their housing units into place and what it takes to carry out that policy. The questions ask about:

- Property characteristics;
- Secondhand smoke-related issues experienced in the apartment complex;
- Existing smoking-related policies;
- Rationale for MUH with no current policies;
- Operator's knowledge, attitudes, beliefs, and intentions regarding smoke-free housing policies;
- Smoke-free housing policy-related costs in the apartment complex; and
- Operator demographics.

Demographic and attitudinal information about the operators are collected so that we can characterize respondents on the basis of age, sex, race, socio-economic status, and smoking history.

Procedures: Based on lessons learned from the pilot study, we have concluded that large property management firms and public housing authorities will need to be contacted several months in advance to address their questions about the study and secure permission to interview operators of the selected MUH complexes (**Attachment 4A-1**). At the time data collection is approved to begin by OMB, operators will first be called by Field Data Collectors using a telephone script tested during the pilot (**Attachment 4A**). If not reached by phone, the Field Data Collector will attempt to visit the MUH complex and schedule the interview in person. Two attempts to schedule the interview will be made before another MUH unit is selected from the replacement pool. At the beginning of the scheduled interview, the MUH operator will be presented with an introduction to the study and an informed consent form to read, ask questions about, and sign (in-person) (**Attachment 6A-1**). The operator will be provided with a copy of the form.

If the MUH operator agrees to be interviewed, the Field Data Collector will administer the MUH Operator Baseline Survey (**Attachment 6A**). After the interview is complete, MUH operators will be asked for permission for the Field Data Collector to conduct the visual assessment of the exterior and entries to the units. Upon completion, the Field Data Collector will provide the operator with a $75 gift card incentive.

The operator will also be asked to provide lists of occupied units and copies of building policy or procedure documents related to the implementation of the policies to protect residents from the ill effects of exposure to SHS in their housing units. This is to provide proven examples of instances where these barriers were avoided, removed, or mitigated.

Finally, MUH Operators will be asked to accompany Field Data Collectors for a short visual assessment of the exterior and common areas of the buildings in each complex where operators are surveyed. Specifically, we assess presence of a designated exterior smoking area, proximity of the smoking area to windows and doors of the buildings, presence of cigarette butts or other smoking debris on the ground outside the entrance to the building, presence of receptacles for cigarette butts at the entry to the unit or in the designated smoking area, exterior and interior signs on smoking policies, smell of tobacco smoke in the hallways and other interior common spaces (e.g., entry foyer), and other housing conditions known to trigger or exacerbate respiratory conditions (such as proximity to highways, deterioration that can allow pests or moisture to enter the building, poor ventilation). This provides an independent verification of the presence of factors that may mask or confound the effects of smoke-free policies in the apartment complex.

Attachment 7A (Smoke-Free MUH Policy Study: Operator Survey – Post-Intervention) will be administered to the respondents who completed the Baseline survey nine months later. There will be no replacement of operators who drop out of the study. Operators will also be asked to provide lists of occupied units and copies of building policy or procedure documents related to the implementation of the policies to protect residents from the ill effects of exposure to SHS in their housing units. Finally, MUH Operators accompany Field Data Collectors for a short visual assessment of the exterior and common areas of the buildings in each complex where operators are surveyed.

B.2.3 The LA MUH Resident Surveys will be conducted in English and Spanish. (**Attachments 8A(e) and 9A(e)** provide the English translation; see **Attachments 8A(s) and 9A(s)** for the Spanish language versions).

Who Collects the Data: Collected by bi-lingual Solutions Field Data Collectors and Westat Field Data Collector Supervisor hired from LA County. Data entry, cleanup and weighting are done by Westat, which will transmit data to LACDPH for analysis.

Where/What: 1,000 resident surveys in LA County, administered twice (baseline and follow-up).

Frequency: LA County: Interviewed twice. We estimate this will take approximately 45 minutes for the adult component of the interview including the visual assessment of the living room and kitchen, and 15 minutes for the children's module.

Purpose. We will conduct face-to-face interviews in English or Spanish, according to resident preferences. The overall goals of these interviews are to characterized residents' experience with SHS, knowledge of the apartment complex's policies to protect residents from the ill effects of exposure to SHS in their housing units, compliance with the policies, changes in health

conditions associated with tobacco-related exposures, and costs (lost work days, medical, and other) associated with these conditions. The questions ask about:

- Housing characteristics and environment;
- Secondhand smoke exposure;
- Knowledge, attitudes and beliefs about secondhand smoke, housing policy implementation and enforcement issues
- Smoking status and cessation behaviors among residents;
- Adult smoking-related illnesses;
- Respondent characteristics**;** and
- Children's module.
- Demographic and attitudinal information about the residents and visual observations of the living room and kitchen are collected so that we can characterize respondents on the basis of age, sex, race, socio-economic status, and smoking history and identify factors that might confound the effects of the smoke-free restrictions, such as ventilation that permits SHS to move between units or the presence of other housing conditions that could independently trigger asthma episodes, such as presence of mold or pests.

Procedures: The Field Data Collectors will recruit selected MUH residents as described below (See description of resident selection procedures in Section B.1). Wearing a shirt that identifies the study as well as a photo ID badge, the Field Data Collector will go to each of the units listed on his/her assignment sheet. At each unit, he/she will introduce him/herself and indicate that he/she is a member of the study team. He/she will ask to speak with an adult household member. The Field Data Collector will determine whether the respondent prefers to speak in English or Spanish, explain the study and gain the householder's consent to be screened for eligibility. The Field Data Collector will administer the screening survey (**pages 4-5 in Attachment 8A**). Specifically, he/she will ask to speak with the adult household member with the most recent birthday. If that person is available, the Field Data Collector will ask to speak with him/her, determine language preference, explain the study, and gain cooperation to complete the MUH Resident Survey. If the selected householder is not available, the Field Data Collector will determine when he/she might be home and leave a resident recruitment flyer for his/her review. Based on that information, the Field Data Collector will either return at the appointed time or will collect a telephone number so that he/she can call and schedule an appointment. The Field Data Collector will also leave a card with contact information should the selected household member want to call and schedule an interview (**Attachment 8A-4** door hanger).

Field Data Collectors will make two attempts to screen a household before closing the case. They will also confirm with the MUH operator that the unit is occupied. For households where the sampled respondent is identified but not available, the Field Data Collector will make three attempts to complete the interview before closing the case.

Once the Field Data Collector has gained cooperation, he/she will have the respondent read the informed consent form), ask questions, and if willing to continue, sign the consent forms including Authorization for Use and Disclosure of Health Information (**Attachments 8A-1 and 8A-2**). The respondent will be provided with a copy of the signed form. If the respondent does not agree to be interviewed, the Field Data Collector will attempt to convert the refusal, following procedures identified in the training manual. After enrollment of the adult resident

participant, the Field Data Collector will then ask if there are children under 18 in the home and if the adult with the most recent birthday is their parent or caregiver. If the adult respondent is not the parent or caregiver, he/she will only be interviewed for the household and asked for the adult saliva sample. Next, we will enroll the parent/guardian and ask that person to respond to the questions that pertain to the children (consent - **Attachment 8A-3; Attachment 8A Resident Survey - Baseline [Section G]**). If the adult respondent is the parent or caregiver, he/she will be asked the entire questionnaire (including the child-related questions) and to give the adult saliva sample (**Attachment 8A-1**).

If the respondent agrees to be interviewed, the Field Data Collector will administer the MUH Resident Survey and conduct a brief visual assessment inside the unit for confounders (i.e., presence of smokers in adjacent units, smell of smoke drifting into the unit from the exterior, etc.).

Attachment 9A (Smoke-Free MUH Policy Study: Resident Survey - Post-Intervention) will be administered to the respondents who completed the Baseline survey nine months later. There will be no replacement of residents who drop out of the study.

B.2.4 Saliva Cotinine Samples of LA County Residents. (**Attachment 10A** for protocol, **Attachment 8A-1** for adult consent and **Attachment 10A-1 for child assent**)

Who Collects the Data: Collected by bi-lingual Solutions Field Data Collectors and Westat Field Data Collector Supervisor hired from LA County, data analyzed by LACDPH.

Where/What: Up to 1,500 samples collected in LA County at the same time as the scheduled MUH Baseline Resident Surveys to reduce burden on respondents, and then nine months later. One adult respondent (randomly selected) per household will be asked to provide a sample (N=1,000); any household with children present at the time of the first resident interview will be asked to provide a child sample if the child is over age two (N=500).

Frequency: LA County: Samples collected twice. We estimate that saliva collection will take no more than 10 minutes per sample.

Procedures: The Field Data Collector will gather saliva samples from each respondent by instructing the respondent how to place a cotton swab under the tongue and hold it there for 1 -2 minutes. Salivary cotinine sampling will be used to measure SHS exposure for a minimum of 500 adults and approximately 250 children over age two each for the intervention and control conditions at Phase 1 (Baseline) and Phase 2 (Post-Intervention) data collection. Children over age two are selected as participants for saliva cotinine sampling in order to assure that they can comply with the saliva collection protocol. Children over the age of seven will be read the assent and then asked to sign the assent (**Attachment 3A-4**). Samples will be transported in a cooler containing ice to the LACDPH, where they will be frozen.

The saliva samples will be sent to Salimetrics Laboratory for analysis (located at 101 Innovation Boulevard, Suite 302; State College, PA 16803). Salimetrics utilizes a high sensitivity (0.15 ng/mL) enzyme immunoassay for the quantitative measurement of cotinine in saliva samples**.** The intent is to obtain a sole source contract with Salimetrics Laboratory. However, in the event

that sole source approval is not obtained from LACDPH Materials Management Division because lower prices are available elsewhere, a laboratory with equal or higher sensitivity and comparable quality assurance procedures will be used.

B.2.5 Indoor Air Quality (IAQ) Monitoring for a seven day period (LA County), maximum of 100 households randomly selected from MUH Resident Survey participants per the intervention and comparison study conditions.

Who Collects the Data: Collected by Solutions Field Data Collectors and Westat Field Data Collector Supervisor hired from LA County, data analyzed by LACDPH.

Frequency: LA County: Samples collected twice, approximately nine months apart. Equipment will be placed in the apartment at the end of the MUH Resident Survey and visual assessment.

Procedures: IAQ monitoring enables us to collect data on residents' exposure to particulates smaller than 2.5 micrometers in diameter, the size of SHS particles as well as other particles know to be associated with respiratory conditions. Airborne particle monitoring equipment will measure particle levels for seven full days to capture a representative sample Field Data Collectors will place monitors in the main living area of each unit in the same location at baseline and follow-up. To reduce the burden of the air quality monitoring to the MUH residents, the pump noise of the monitors will be mitigated with muffling material in a plastic receptacle to eliminate annoyance for unit occupants. We estimate that it will take 30 minutes to set up the equipment and train one resident to complete the household diary, 30 minutes to collect the equipment, and five minutes daily for the resident to complete the diary.

The following equipment will be used per unit: (1) An industry-standard real-time SidePak laser photometer for measuring continuous $PM_{2.5}$ levels; (2) An industry-standard gravimetric $PM_{2.5}$ filter-and-pump sample; and (3) a novel and inexpensive real-time Dylos particle counter, which has been used to roughly discriminate different types of aerosol sources allowing us to segregate levels associated with cooking, ambient, or suspended dust sources in the monitored unit. Real-time particle monitors will be calibrated in the laboratory against a TEOM particle standard to obtain mass conversion factors for a range of particle source types.

Following the protocol developed for airborne particle monitoring ,the Field Data Collector will set up the monitor (**Attachment 11A**) and instruct the residents on how to complete a diary (**Attachment 11A-1**). Diaries kept by the residents during the seven days help to identify periods of SHS exposure and exposure to other sources of particulates that could obscure the effects of a smoke-free policy, including tobacco smoke odor, as well as times spent at home, cooking and cleaning activities, and other particle-generating activities (**Attachment 11A-1** for household diary,) For units assigned to airborne particle monitoring, we estimate 30 minutes for set up. Field Data Collectors will return to units selected for environmental airborne particle assessment seven days after data collection began in the unit to retrieve the air monitoring equipment and diaries.

The effect of tobacco smoke contamination (e.g., tobacco odor) will be controlled in the statistical modeling of the data. All real-time data will be immediately downloaded at LACDPH

by the LACDPH staff once the monitors are retrieved from a given unit and stored on a password-protected server. Filter samples will be frozen until re-weighing is performed. Duplicate filter samples will be gathered in each unit for each monitoring period and blanks will be used for each batch of weighing.

B.2.6 Resident Focus Groups in Minnesota, Maine and Florida. The Minnesota, Maine and Florida component research questions are:

1. What are the most often experienced and most challenging barriers to adopting voluntary and regulatory MUH policies to protect residents from the ill effects of exposure to SHS in their housing units?
2. What are examples of how these barriers were avoided, removed, or mitigated?
3. What are effective strategies for adopting voluntary and regulatory policies?
4. How can local successes in adopting and implementing voluntary or regulatory policies be scaled up to the national level?

Who Collects Data: Collected by Healthy Housing Solutions and Westat senior project team members; data analyzed by Solutions.

Where/What: Four Focus Groups of up to 10 residents of the MUH complexes whose operators were interviewed in Minnesota, Maine, and Florida (estimated total of 120 resident participants). Residents will be recruited through flyers, newsletter articles, and door-to-door (**Attachments 12A-1 and 12A-2**). All participants will be asked to complete consent (**Attachment 13A-1**) and a short demographic and attitudinal survey (**Attachment 13A**).

Frequency: One time.

Purpose: To provide qualitative data on residents' views of the process of adopting and enforcing MUH policies to protect residents from the ill effects of exposure to SHS in their housing units. Qualitative research techniques such as focus groups allow in-depth exploration of one topic during the group session and are thus able to identify differences in participants' perceptions of the topic at the time of administration. These focus groups will have two primary themes: 1) the process by which residents were incorporated into the development of existing MUH policies (**Attachment 13B**) and 2) the outcomes of the policies adopted (**Attachment 13C**).

Procedures: Once the MUH operators in these communities have been interviewed, residents will be recruited from those complexes by posting flyers and door hangers in the buildings and by entries in any existing community newsletters (**Attachments 12A-1 and 12A-2**). Interested potential participants will call a toll-free number to be screened for assignment to a focus group (**Attachment 12A**). The telephone screening interview will be used to assure a mix of resident types (smokers v. nonsmokers, residents of market-rate v. subsidized housing, parents v. nonparents) are assigned to the different focus groups. There will be a maximum of 4 focus groups per state. Two of these will focus on residents' involvement in the process of adoption and implementation of MUH policies to protect residents from the ill effects of exposure to SHS in their housing units; the other two will focus on their experience with the policies. Each type of

focus group (process and outcome-oriented) has its own question guide (**Attachments 13B and 13C**). Within each of these broad thematic groupings, we will look at residents in MUH units that had voluntarily or have been required by regulation applied policies that 1) ban smoking in common areas (playgrounds, hallways, laundry rooms, etc.) but not the individual units or 2) ban smoking throughout the complex, including the units. Our telephone screening survey will be used to assign interested respondents to the appropriate focus group.

Solutions and Westat representatives will travel to the location and serve as facilitators for the focus groups. Conduct of the focus groups will occur as follows:

- Groups will be held in locations convenient to residents, and at least one group per jurisdiction will be held in the evening. This may require rental of venues if they cannot be provided at the MUH complexes.
- No more than 10 questions related to a main theme will be covered in the session. Follow-up to participants' comments will occur during the allotted time.
- All group sessions will be audio-recorded to enable transcription of the session. The assistant facilitator will be responsible for monitoring the tape recorder, taking notes, and alerting the primary facilitator to the time elapsed. The assistant facilitator will assign respondents a code so that it will be possible to identify their individual comments during transcription.
- The facilitator or assistant facilitator may use a flip chart and markers to note major themes or to temporarily "table" topics for later discussion.
- Participants will be provided an introductory package that contains a consent form and a short demographic and attitudinal survey. These forms will be collected by the assistant facilitator at the start of the discussion.
- The facilitator will welcome the participants, remind them of the purpose of the group, and set ground rules for participation (e.g., raising hands, no right/wrong answers, everyone gets to speak, "what is said in the room stays in the room." the fact that the session will be tape-recorded, etc.).
- There will be an ice-breaker to increase participants' comfort level with discussion.
- The facilitator will manage time so that all topic areas are addressed. The facilitator will manage the discussion in a non-judgmental way so as to elicit participants' expression of views on all topics.
- After the participants leave, the facilitator and assistant facilitator will debrief while the tape is running to identify date, time, and name of group.

B.3 Methods to Maximize Response Rates and Deal with Non-response in Los Angeles County

Published findings for both residential and operator surveys suggest that some nonresponse can be expected. Nonresponse in pre/post surveys stems primarily from noncontact, refusals, and attrition. Nonresponse is a potentially serious methodological threat to the interpretation of the study findings if it occurs differentially across the study conditions (i.e., nonignorable nonresponse). Although differential nonresponse is a potential problem in both the cross-sectional and longitudinal aspects of the study, we are primarily concerned with differential

nonresponse in the longitudinal study as it could bias conclusions made regarding the health, social, and cost impact of MUH policy adoption and implementation.

To reduce the potential for nonresponse bias, a wide array of strategies will be utilized and are presented below.

Preventing Nonresponse through Minimizing Noncontacts

Noncontacts are particularly problematic because if the Field Data Collectors are not able to conduct the screener questions, it is not possible to know if the unit would have been eligible for the survey. To minimize noncontact rates, Field Data Collectors will make multiple visits to each sampled unit. These visits will include weekdays and weekends. Field Data Collectors will also visit at different times of day, to the extent it is safe to be in the area.

Preventing Nonresponse through Avoidance of Refusals

Avoidance of refusals requires a thorough understanding of the primary factors for decisions regarding respondents agreeing to participate in the study. Key respondent refusal factors include untoward reaction to "introductory" materials and contacts (e.g., letters, phone contacts); lack of interest in study aims; lack of adequate incentive fees relative to burden of participation; cultural barriers; inadequate training and inexperience of Field Data Collectors; and task demands of study participation (e.g., length of survey forms, airborne particle monitoring data collection burden).

Each of these determinants of refusal will be mitigated through a wide array of methods, including hiring of high quality bilingual staff, implementation of quality assurance procedures such as close supervision of the Field Data Collectors by the Field Data Collector Supervisor and members of the study team, and through comprehensive training. For example, Field Data Collectors will undergo a rigorous three-day training conducted by Solutions, Westat, and LACDPH staff and contractors (Dr. Tony Kuo and Dr. Neil Klepeis) on the necessary skills to execute the study, including participant recruitment; administration of the MUH Operator and Resident Surveys; and handling and field storage procedures for completed surveys and samples. The goal of training will be to prepare staff to successfully perform field survey tasks in a consistent and standardized fashion. A comprehensive training manual will also be distributed to each Field Data Collector working on the LA County MUH operator and resident surveys. Topics of the training manual include general interviewer techniques (e.g., the appropriate way to ask questions and record answers, contacting and recruiting participants, professional behavior, and standards and ethics) and gaining cooperation and refusal conversion. To address cultural barriers, resident respondents will have the option of conducting the interviews in English or Spanish. In addition, all "introductory" materials will have been carefully reviewed to preclude untoward reactions by participants, and will be translated into Spanish before data collection begins. Reasonable incentive fees will be offered to offset the burden of participation.

In spite of the use of extensive refusal avoidance procedures, participant refusal is unavoidable. Weighting procedures will be used to minimize the effects of nonresponse.

Preventing Nonresponse through Mitigation of Attrition

We will utilize two primary approaches to mitigate attrition. The first approach is to maintain contact information for study participants through implementation and maintenance of effective tracking procedures. In addition, establishing good rapport with the participants during Phase 1 (Baseline) data collection is critical to reducing attrition. The hiring of high quality Field Data Collectors and offering of comprehensive training increases the likelihood that their interactions with participants will promote cooperation. The second approach for mitigating attrition is through the calculation of adjustment weights to correct for possible attrition.

Methods for Investigating Impact of Nonresponse

Nonresponse will be evaluated at Phase 1 (Baseline) and Phase 2 (Post-Intervention) of the study. Simple descriptive statistics, such as counts and frequencies, will be tabulated for respondents and nonrespondents. Nonrespondents can be further divided into categories of refusals and noncontact. After Phase 2 (Post-Intervention), response rates will be calculated and comparisons between respondents and nonrespondents on socio-demographic characteristics (e.g., age, gender, and race/ethnicity) and other relevant factors will be performed.

Management of Missing Data and Other Issues

Missing data

For variables with less than 10% of missing data, an imputation strategy may be applied to estimate the missing data based on the distribution of each individual's baseline characteristics such as age, gender, race/ethnicity, education, and household income. If the survey data were poorly collected resulting in substantial missing data for some variables (>20%), the characteristics of the missing data will be carefully examined and handled with appropriate strategies.

Loss to follow up

Loss to follow-up is a potential methodological issue due to the high mobility of the renter population. We will be able to characterize the issue by comparing the distribution of baseline characteristics and outcomes of respondents who remained in the study to those who were lost to follow-up. Differential attrition is particularly problematic for interpreting the study findings and a wide array of precautions are being taken to mitigate nonresponse as noted above.

Seasonality

The incidence of respiratory symptoms and asthma attacks varies from season to season. If the follow-up survey is conducted in a different season from the baseline survey, seasonality will be adjusted in the analytical models.

Weighting Los Angeles County Data

To ensure that the study findings can be generalized to the target MUH resident population, a population weight will be generated and used in all statistical analyses.

Description of Sample Weighting for Los Angeles Resident Survey

At the completion of Phase 2 data collection, the respondents will be weighted to provide unbiased estimates for the population of MUH residents in the 18 cities proposed for study. These weights will be used in all analyses.

The initial probability of selection for a respondent is the probability of selecting their MUH, times the probability of selecting their unit given their MUH was selected. The base weight for that respondent is one over this probability, and is given by the following equation:

$$BWGT = 1 / [P(MUH)*P(unit|MUH)]$$

This base weight is multiplied by separate adjustments for Phase 1 (Baseline) non-contacts and nonresponse. These must be done separately since it is unknown if non-contacts are eligible or not (does someone truly live there and do they exclude smoking in the unit). Nonresponse can happen at two stages. If the residents refuse to answer any questions, then they are also of unknown eligibility and will be included in the first adjustment. Those who have confirmed eligibility but then do not complete the questionnaire (for whatever reason, including that the randomly sampled adult is not available at any attempted visit) will be adjusted for in a second nonresponse adjustment.

The eligibility adjustment will be based on the observed eligibility rate among those whose eligibility is finalized. So, for example, if 90% of units with finalized eligibility have been found to be eligible, then 90% of those with unknown eligibility will be assumed to be eligible as well.

Thus the weight after the first phase of data collection will be

$$WGT_P1 = BWGT*ELIG_ADJ*NR_ADJ$$

Field Data Collectors will attempt to conduct Phase 2 (Post-Intervention) with all of the respondents to the first phase of data collection. Attrition will take place due to two sources: the Phase 1 (Baseline) respondent may no longer live in the MUH, or they may become a nonrespondent. If they have moved out of the MUH, they are no longer eligible for the study, which attempts to measure the health impact on residents of the MUH. It is unknown if they would have similar health impacts as those who remain, so it is possible that this exclusion will underestimate the full impact of the change in smoking policies. It is anticipated that the number of such movers will be relatively small due to the timing of the two phases of data collection.

The weights for movers will be set to 0. The Phase 2 (Post-Intervention) completed cases will have their Phase 1 (Baseline) weight adjusted for Phase 2 (Post Intervention) nonrespondents to provide a final weight:

$$FNL_WGT = WGT_P1*P2_ADJ$$

To the extent that large numbers of completes are available for a given city, these adjustments will be conducted within the city. In many cases the number of completes will be too small, in which case the treatment cities will be collapsed for adjustment (and similarly the control cities).

The above procedure is for estimating health effects and costs based on the proportion of MUH units. For analyses of health effects and costs for adults living in MUHs, it will be necessary to multiply the FNL_WGT by the number of adults living in the unit. The same procedure will be followed for the weights per children.

There are no control totals for the number MUH units or the number of adults living in MUHs in each city (or even all of LA County), so there is no opportunity to post-stratify to reduce variability.

We are collecting air monitor measurements from 100 treatment units and 100 control units. These will be spread across 200 MUHs, from which one of the sampled units in each MUH will be selected to also have air monitoring. The air monitors from MUHs in a given size-by-treatment stratum will represent the air in all units in such MUHs. If the sampling frame indicates that there are N_h units in that stratum, and we collect air monitoring from n_h of them, the air monitor weight will be:

$$AIR_WGT = N_h/n_h$$

Los Angeles County Operator Survey
Weighting the operators is more straightforward than the residents, since all operators in the sampled cities are eligible. The base weight is simply one over the probability of selecting the MUH:

$$BWGT = 1 /P(MUH)$$

There is a nonresponse adjustment for Phase 1 (Baseline) refusal to participate. If a MUH has gone out of business, its weight will be set equal to 0:

$$WGT_P1 = BWGT* NR_ADJ$$

This will be the final weight unless some of the operators either refuse to participate with Phase 2 (Post-Intervention) or have gone out of business in the interim. If either of those occur, we will compute a final weight as:

$$FNL_WGT = WGT_P1*P2_ADJ$$

B.4 Test of Procedures or Methods to be Undertaken

Both the MUH Operator and the MUH Resident Baseline Survey were subject to a pilot test conducted by Healthy Housing Solutions and Westat. Modified versions of the recruitment materials, consents, and Operator and Resident Surveys were piloted in MUHs in Baltimore and Gaithersburg, MD from October 21-31, 2011. The Post-Intervention version of the LA County MUH Operator and Resident surveys will be a minimally modified version of the Baseline survey.

The goals of the pilot were to:

- Test and revise the protocols for survey administration and participant recruitment;

- Ensure clarity of questionnaire language; and
- Identify timing; skip pattern, and other complex conceptual issues that may not be readily obvious from simple reading of the questionnaire.

Following the pilot, the materials were revised to improve clarity, and shortened to reduce response burden by approximately 10-15% overall. The interviews and feedback received from awardees participating in the pilot led to the conclusion that collecting data from MUH Operators and Residents in-person is both feasible and preferable to a telephone survey of these respondent categories.

Who Collected the Data: Healthy Housing Solutions, Inc.and Westat.
Materials piloted:

1. Recruitment materials for operators (phone screening script, appointment confirmation letter);
2. Recruitment materials for residents (recruitment flyer, phone screening script, appointment confirmation letter);
3. Consent and MUH Operator Questionnaire with supplemental observational data; and
4. Consent and MUH Resident Questionnaire with supplemental observational data.

Purpose of the pilot was to:

- Test and revise the protocols for survey administration and participant recruitment;
- Ensure clarity of survey language; and
- Identify timing; skip patterns, and other complex conceptual issues that may not be readily obvious from simple reading of the survey.

To minimize burden and to use questions previously tested with similar populations or housing types, the MUH Operator and MUH Resident questionnaires adapted questions from the following studies (**Attachment 3A** for more details):

1. Roswell Park Cancer Institute's surveys of Multi-Unit Housing Operators and Residents;
2. Multi-unit Housing Owner/Manager Survey Questionnaire funded by the California Department of Public Health's Tobacco Control Program and conducted on behalf of the University of California, Los Angeles and the California Apartment Association;
3. Behavioral Risk Factor Surveillance Survey 2011;
4. Los Angeles County Health Survey 2011;
5. Massachusetts Tobacco Survey – Adults;
6. California Tobaccos Survey – Adults;
7. Strata Corporation and Context Research, Ltd. Residents in MultiUnit Dwellings, 2008. Conducted on behalf of the Heart and Stroke Foundation of B.C. and Yukon to support the British Columbia Smoke-Free Housing in Multi-Unit Dwelling (MUDs) Initiative;
8. National Survey of Lead and Allergens in Housing: Resident Questionnaire, study sponsored by the US. Department of Housing and Urban Development and the National Institute of Environmental Health and Sciences; and
9. Healthy Housing Inspection Manual, 2008, developed by the Centers for Disease Control and Prevention and the U.S. Department of Housing and Urban Development.

Healthy Housing Solutions and Westat piloted four operator and three resident surveys in English. Consents took approximately five minutes to complete. The operator surveys took approximately 50 minutes to complete. The visual assessments for the operator surveys took approximately 30 minutes. Resident surveys took approximately 35-50 minutes to complete, depending on person selected (resident adult completion took approximately 35 minutes; parents with children took 15 minutes). Visual assessments following the resident surveys took approximately 15 minutes. All participants received $30 gift card incentives at the completion of the interview.

Following the pilot of the MUH Operator and Resident Surveys, the survey materials were revised to improve clarity and shortened to reduce response burden by approximately 10-15% overall. The cotinine sampling collection protocol was not pilot tested because it is similar to the one that has been recently used by one of the study team members in LA County for the purpose of collecting data for the National Health Examination and Nutrition Survey. That individual will oversee the data collection and analysis using the same protocol. The key difference between the NHANES protocol and the one proposed here is that the Salimetrics testing methodology utilizes a high sensitivity (0.15 ng/mL) enzyme immunoassay for the quantitative measurement of cotinine in saliva samples**.**

There was no formal pilot of the IAQ monitoring protocols since this protocol is currently being used in MUH units studied by LACDPH'S CPPW program. This project has contracted with the same individual to oversee data analysis for the IAQ monitoring using the same protocol. However, to illustrate the feasibility of the study's technical approach, Table 6 presents the airborne particle monitoring data recently collected from 9 different multi-unit housing (MUH) locations in LA County in the table below. The monitored units cover a broad range of building and construction types, income levels, and types of secondhand smoke transfer. Sites were chosen among nonsmoking persons who complained of secondhand smoke odor in their unit. Typically, smoke was reported to travel up through cracks along the edge of the floor, or through cracks around electrical outlets or bathroom piping. In some cases, smoke odor was reported near air vents or when smoke came in through open balcony doors or windows when active smokers were present outdoors. These cases demonstrate that the problem of SHS transfer in MUH can affect nearly anyone who lives next to a smoker. In several of the units, the contractor obtained clear evidence of high levels of particulate matter associated with secondhand smoke.

Table 6. CPPW Recent IAQ Monitoring Results

	City	Complex Type	No. of Levels	Size of Complex	Unit Type	Hotspot – Infiltrating Smoke
1	Long Beach	Condominiums	2	4-12/BLDG; 3 BLDGS	3 BDRM	Cracks in bedroom floor; window
2	Santa Monica	High Rise Condos	17	500+/BLDG; 2 BLDGS	1 BDRM	Balcony and outlets
3	Santa Monica	Apartments	3	9-18/BLDG; 7 BLDGS	1 BDRM	Electrical
4	Los Angeles	Rent-Controlled	2	6/BLDG; 2 BLDG	STUDIO	Cracks in closet floor

		Apts.				
5	Palmdale	Senior Living	4	200+/BLDG;1 BLDG	1 BDRM	Bathroom; outlets
6	Palmdale	Senior Living	4	1 BLDG	1 BDRM	Bathroom; outlets
7	Glendale	Condominiums	2	50+/BLDG; 1 BLDG	2 BDRM	Bathroom pipes
8	Pasadena	Apartments	3	10-30/BLDG;3 BLDG	2 BDRM	Floor Vents
9	Van Nuys	Apartments	2	8/BLDG; 4 BLDG	1 BDRM	Floor vents

B.5 Individuals Consulted on Statistical Aspects and/or Analyzing Data

Table 7 identifies the individuals who were consulted on statistical aspects and data analyses:

- Members of the Healthy Housing Solutions, Westat, and LACDPH team: Dr. Mark Weber, Dr. David Marker, Dr. Tony Kuo, Dr. Neil Klepeis, Mr. Rick Nevin, Ms. Sarah Wylie; Ms. Carolyn Kawecki, Mr. Jack Anderson, Ms. Mary Dingwall, and Ms Linda Aragon.
- Developers of MUH Operator and Resident surveys referred to in the development of the pilot survey documents (Brian King, Michael Ong); and
- The Supervising Epidemiologist for the Los Angeles County Health Survey,(Amy Lightstone) and other LACDPH offices, including the senior health economist (Dr. Ricardo Basurto-Davila).

Table 7. List of individuals and organizations that were consulted for the study

Name	Organization	Contact Information
Dr. Mark Weber	Healthy Housing Solutions	Phone: 213- 351-7890 Email: mweber@ph.lacounty.gov
Dr. David Marker	Healthy Housing Solutions	Phone: 301- 251-4398 Email: markerd1@westat.com
Dr. Tony Kuo	LACDPH	Phone: 213- 351-7341 Email: tkuo@ph.lacounty.gov
Neil Klepeis, PhD, MS	Education, Training, and Research Associates	Phone: 831-406-1088 Email: neil@exposurescience.org
Mr. Rick Nevin	Healthy Housing Solutions	Phone: 703-435-2725 Email: ricknevin@verizon.net

Ms. Sarah Wylie;	Westat	Phone: 919-699-3351 Email: sarah.wylie@gmail.com
Ms. Carolyn Kawecki	Healthy Housing Solutions	Phone: 301- 524-5078 Email: carolynkawecki@yahoo.com
Mr. Jack Anderson	Healthy Housing Solutions	Phone: 443-539-4182 Email:jandesron@healthyhousingsolutions.com
Ms. Mary Dingwall	Westat	Phone: 301-738-3583 Email: marydingwall@westat.com
Ms. Linda Aragon	LACDPH	Phone: 213-351-7811 Email: laragon@ph.lacounty.gov
Michael Ong, MD, PhD	Department of Medicine, General Internal Medicine and Health Services Research, University of California, Los Angeles	Phone: 310-794-0154 Email: mong@mednet.ucla.edu
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Richardo Basurto-Davila, PhD, MSc	Office of Health Assessment and Epidemiology, Los Angeles County Department of Public Health	Phone: 213-989-7127 Email: ribasurto-davila@ph.lacounty.gov
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Janice Casil, MPP	Tobacco Control and Prevention Program, Project RENEW, Los Angeles County Department of Public Health	Phone: 213-427-4413 Email: jcasil@ph.lacounty.gov
Brian King, PhD	Office of Smoking and Health; National Center for Chronic Disease Prevention and Health Promotion, CDC	Phone: 770-488-5107 baking@cdc.gov

Table 8 identifies team leads for all activities.

Table 8. Leads in Data Collection, Research/Sampling Design, and Data Analysis				
Task	**Lead**	**Affiliation**	**Reviewer**	**Contact Information**
Data Collection				
a) MUH Operator Survey for non-Los Angeles communities	Carol Kawecki, Sarah Wylie	Solutions	Solutions, Westat	Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com Email: sarah.wylie@gmail.com
b) Focus groups for non-Los Angeles communities	Carol Kawecki, Sarah Wylie	Solutions		Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com Email: sarah.wylie@gmail.com
	Mary Dingwall	Westat		Phone: (301) 738-3583 (Mary) Email: MaryDingwall@Westat.com
c) All data collection activities for Los Angeles County	Carol Kawecki,	Solutions	Jack Anderson, Dr. Mark Weber, Dr. David Marker	Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com
	Mary Dingwall	Westat		Phone: (301) 738-3583 (Mary) Email: MaryDingwall@Westat.com
Study Design				
a) Los Angeles County study design	Dr. Mark Weber	Solutions	Solutions, Westat	Phone: (213) 351-7890 (Mark) Email: mweber@ph.lacounty.gov
	Dr. Tony Kuo	LACDPH		Phone: (213) 351-7341 (Tony) Email: tkuo@ph.lacounty.gov
c) Non-Los Angeles communities study design	Carol Kawecki, Sarah Wylie	Solutions	Solutions, Westat	Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com Email: sarah.wylie@gmail.com
	Mary Dingwall	Westat		Phone: (301) 738-3583 (Mary) Email: MaryDingwall@Westat.com

e) Logic model	Dr. Mark Weber, Carol Kawecki,	Solutions	Solutions	Phone: (213) 351-7890 (Mark) Email: mweber@ph.lacounty.gov Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com
	Dr. Tony Kuo, Ms. Linda Aragon	LACDPH		Phone: (213) 351-7341(Tony) Email: tkuo@ph.lacounty.govPhone: (213) 351-7811 (Linda) Email: laragon@ph.lacounty.gov
g) Study sampling plan for Los Angeles County	Dr. Mark Weber	Solutions	Solutions, Westat LACDPH	Phone: (213) 351-7890 (Mark) Email: mweber@ph.lacounty.gov
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i) Sample weighting design	Dr. David Marker	Westat	Dr. Mark Weber	Phone: (301) 251-4398 (David) Email: markerd1@westat.com
j) MUH Operator and Resident Surveys	Dr. Mark Weber	Solutions,	Carol Kawecki, Mary Dingwall, Dr. David Marker, Sarah Wylie, Rick Nevin, Jack Anderson	Phone: (213) 351-7890 (Mark) Email: mweber@ph.lacounty.gov
	Dr. Tony Kuo, Ms. Linda Aragon	LACDPH		Phone: (213) 351-7341 (Tony)Email: tkuo@ph.lacounty.gov Phone: (213) 351-7811 (Linda) Email: laragon@ph.lacounty.gov
l) Salivary cotinine collection	Dr. Tony Kuo	LACDPH	Dr. Mark Weber, Carol Kawecki, Mary Dingwall, Dr. David Marker, Jack Anderson	Phone: (213) 351-7341 Email: tkuo@ph.lacounty.gov

m) Airborne particle monitoring	Dr. Neil Klepeis	LACDPH contractor	Carol Kawecki, Mary Dingwall, Dr. David Marker, Jack Anderson	Email: neil@exposurescience.org
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o) Visual inspection protocol of MUH complexes	Carol Kawecki, Jack Anderson, Sarah Wylie,	Solutions	LACDPH, Dr. Neil Klepeis, Dr. David Marker	Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com Email: janderson@healthyhousingsolutions.com Email: sarah.wylie@gmail.com
	Mary Dingwall	Westat		Phone: (301) 738-3583 (Mary) Email: MaryDingwall@Westat.com
Data Analysis				
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	Dr. Tony Kuo	LACDPH		Phone: (213) 351-7341 (Tony) Email: tkuo@ph.lacounty.gov
c) Data analysis for non-Los Angeles communities	Carol Kawecki, Sarah Wylie	Solutions	Dr. Mark Weber, Dr. David Marker, Mary Dingwall, Jack Anderson	Phone: (301) 524-5078 (Carol) Email: carolynkawecki@yahoo.com Email: sarah.wylie@gmail.com
d) Los Angeles cost-benefit analysis	Rick Nevin	Solutions	Dr. Ricardo Basurto-Davila, Dr. Mark Weber, Dr.	Email: ricknevin@verizon.net

			David Marker	

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