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Abstract

Vaccinating homebound individuals during the COVID-19 pandemic presented several challenges, including time and cost of engaging this group. In Los Angeles County, the departments of Public Health and Aging and Disabilities turned to home delivered meals programs (HDMs) for help with this public health priority. A mixed-method organizational assessment of 34 HDMs was conducted during March–April 2022 to describe these efforts. Most HDMs were nonprofit (67.6%) and had <25 staff (58.8%). Overall, they served a large catchment area before and during COVID-19, providing services to an estimated total of 24,995 clients/week and delivering 19,511 meals/day. A majority (82.4%) reported engaging their clients to facilitate COVID-19 vaccinations. As of early 2022, <6% of these HDMs' homebound clients were unvaccinated. These programs' efforts to assist older individuals who were homebound during the pandemic represent a potentially underutilized model of public-nonprofit/not-for-profit partnership for improving vaccine delivery and uptake in this hard-to-reach population.

Keywords

home delivered meals programs, homebound, COVID-19 vaccine

What this paper adds

- Offers a snapshot of how home delivered meals programs played a role in reaching and assisting homebound individuals to obtain the COVID-19 vaccine during the pandemic.
- Describes a model of public-nonprofit/not-for-profit partnership that served as a resource for addressing the needs of the homebound population in a large, urban jurisdiction during the pandemic, including outreach to help clients obtain the COVID-19 vaccine.

Applications of study findings

- Findings from the organizational assessment suggest that the partnership model could be strengthened and expanded to include vaccinations for other communicable diseases (e.g., influenza, pneumococcal), beyond just for COVID-19.

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic has resulted in a number of significant challenges for homebound individuals (Ankuda et al., 2021). Because of their age and health profile, they are often at an elevated risk for severe disease and death from COVID-19 (Kompaniyets et al., 2021). While the risk can be lowered with vaccination, being homebound frequently limits access to this potentially life-saving intervention (Dar et al., 2021). During the global public health emergency, barriers to vaccine access for this vulnerable group have included increased social isolation, loneliness, anxiety, and depression (Ankuda et al., 2022; Sørbye et al., 2022).

Determining how to efficiently engage/reach homebound individuals is among one of the top priorities of local jurisdictions like Los Angeles County (LAC). In such a densely populated (~10 million), geopolitically diverse region (Census, 2021), ascertaining the number and needs of homebound individuals, and efficiently addressing them, represent an immensely difficult task to accomplish. Throughout the health crisis, multidisciplinary COVID-19 mobile vaccine programs have served as a resource for addressing this problem in the United States and have been successfully leveraged regionally (Alcendor et al., 2022; Gliatto et al., 2021).

To increase COVID-19 vaccine access among this high-risk group, the County of Los Angeles departments of Public Health (DPH) and Aging and Disabilities (AD) turned to health plans, several community organizations, and a network of home delivered meals programs (HDMs) for help. The latter network serves many homebound older individuals who have multiple chronic conditions. HDMs are publicly and/or privately funded, relying on both paid and volunteer staff to deliver services. They typically offer in-home meal deliveries or congregate meals, and can provide social support/wellness checks when needed. Prior research has demonstrated that receiving HDM services can lead to client improvements in nutrition, physical and mental health, and quality-of-life (Gualtieri et al., 2018).

HDMs (including Meals on Wheels [MOW] programs) in LAC were particularly well-positioned to help, given their strong presence in the community and the home meal services they already provide to this hard-to-reach group. Throughout the pandemic, these organizations worked closely with health and social services agencies (e.g., DPH, AD, federally qualified health centers) to collect complete information about the homebound population and assist this group with obtaining the COVID-19 vaccine.

The present study chronicles these local HDM efforts to engage and assist homebound individuals with obtaining the COVID vaccine. It analyzed data from an organizational assessment (OA) conducted during March–April 2022.

Methods

The OA sample comprised MOW and non-MOW programs; the former describes programs whose primary purpose is to

deliver meals, while the latter includes entities that provide various services, one of which is delivering meals to the home (e.g., senior centers). High-level representatives from each of the eligible organizations were asked to complete an assessment survey on behalf of their agencies. Organizations were ineligible if they did not serve any homebound clients or could not answer a majority of the survey questions.

The OA instrument was developed by DPH, in collaboration with AD and Meals on Wheels West, via an iterative process. To ensure high level of participation by HDMs, significant efforts were made to involve representative leadership in the survey development. The instrument was designed to capture organizational and clientele characteristics and was administered online via SurveyMonkey. The instrument contained 16 multiple choice, select all that apply, and open-ended questions, taking ~10 minutes to complete.

An online link was initially e-mailed to 41 HDMs during March 14–April 28, 2022. This was followed by reminder phone calls and emails. In several instances, HDM representatives preferred to respond via live telephone interviews rather than via the online format. Compensation/incentives were not provided for participation. All study materials and protocols were approved by DPH's Institutional Review Board (IRB No. 2002-02-989).

The assessment survey collected information on the characteristics of the organizations, their clientele overall, and their homebound clients specifically. Organizational characteristics consisted of location (zip code), provider type, number of staff, and service catchment areas that the organization works in (i.e., pre-COVID-19 vs. current). Overall client characteristics consisted of the number of clients served/week, number of meals delivered/day, and the populations served (i.e., low-income, communities of color, age groups, people with disabilities, persons experiencing homelessness). The survey also asked about ways in which an organization had been assisting clients with obtaining the COVID-19 vaccine, and what types of external support they would prefer to have from local health departments/health agencies to further increase vaccine access and uptake. To help provide context on homebound individuals (Leff et al., 2015), the survey included questions about the frequency of encountering clients who used various medical equipment/supplies (e.g., ventilators, cardiac devices) or services (e.g., home health services). Data on HDMs' homebound clients included the definition that each organization used to classify their clients as "homebound," the total percentage of their clients who are considered homebound based on this criterion, and the estimates of these individuals' vaccination status. For the latter, HDMs were asked to explain how they arrived at their estimates.

For quantitative data analysis, SAS version 9.4 (SAS Institute, Inc., Cary, North Carolina) was used to generate frequencies and percentages for categorical variables, and means and standard deviations for continuous variables. Where applicable, comparisons of the different variables

(e.g., by organizational size) were evaluated using t-tests (for continuous variables) and Fisher's Exact tests (for categorical variables). A p -value of <0.05 was considered statistically significant.

For qualitative data analysis, thematic sorting was employed to analyze the responses to the open-ended question: "Among your clients, how do you determine if someone is 'homebound'? That is, what is your definition of homebound?" Major and sub-themes were extracted, tabulated, and coded using this technique.

Finally, using zip code and pre-COVID-19 and current service catchment area information from the OA, two maps were generated via spatial analysis software (COLA, 2022); they display the headquarter locations and program activities from across the county (Supplemental Figure-A).

Results

Of the 41 HDMs that were initially recruited, 34 were eligible to participate; all 34 completed the assessment (response rate = 100%). The majority were nonprofit (67.6%) and had fewer than 25 staff (58.8%) (Table 1). They served, on average, 735 clients/week (range 33–9500) and delivered 574 meals/day (range 9–2600) (Table 1). The estimated total clients served/week was 24,995, while the number of meals delivered/day was 19,511. Geographically, the HDMs' locations were widespread across LAC (Supplemental Figure-A). Their current service catchment areas were very large, covering 234 unique zip codes including unincorporated communities. Their pre-COVID-19 service catchment areas were similar, covering 225 unique zip codes. Since the beginning of the pandemic, 44.1% of the HDMs experienced an increase in their service catchment area size (Table 1).

Overall, there were minimal differences observed by organization size, except for the volume of services provided by the HDMs. Large organizations, for example, served, on average, 6.1 times as many meals/day ($p = 0.0019$), and 2.2 ($p = 0.0039$) as well as 1.7 ($p = 0.0154$) times higher percentage of communities of color and low-income populations, respectively, as small organizations. Large organizations also tended to serve more clients who used at-home ESRD-dialysis.

According to the 34 HDMs, their clientele, collectively, were comprised primarily of adults aged ≥ 65 years (81.4%), with more than half being low-income (54.9%), communities of color (e.g., Black, Asian American or Pacific Islander, Latino) (42.5%), and/or individuals with disabilities (37.4%) (Table 1). Some of their most frequently encountered clients include those who used home health services, motorized wheelchairs or scooters, and electric beds in their home (Table 2).

Approximately half of the HDMs (50.0%) defined "homebound" as "very difficult, unable, or contraindicated to leave home or bed"; other common definitions included

"injury, health condition, or disability" (40.6%), and "unable to afford, shop for, or prepare meals" (37.5%) (Supplemental Figure-B). Only 5 HDMs mentioned using a formal assessment to define homebound status; 2-of-5 mentioned dropping this requirement during the pandemic. Using these definitions, HDMs estimated that, on average, 76.8% of their clients were homebound (Table 3).

Based on HDMs' own estimates, as of March–April 2022, 46.3% of their homebound clients were fully vaccinated and had received boosters for COVID-19; the remaining were fully vaccinated with no booster/additional doses (37.2%), partially vaccinated (10.7%), or unvaccinated (5.9%) (see Table 3—weighted means are also provided in the table). Additionally, 82.4% indicated they provided some type of assistance to their homebound clients to help them get vaccinated, with 73.5% reporting they provided direct assistance (e.g., organizing transportation or mobile vaccine events) to help clients obtain the vaccine. When asked, most HDMs were interested in further assistance from local health departments/health agencies. The most commonly desired assistance or resources were: COVID-19 testing kits (64.7%), public health policies that help reduce the risk of infection among vulnerable aging adults (64.7%), in-home vaccination services (61.8%), personal protective equipment (61.8%), and access to mobile vaccinations (41.2%) (Table 3).

Discussion

This study chronicles HDMs' efforts to engage and assist homebound individuals in LAC during the pandemic. Despite staff shortages, these organizations were able to serve many clients/week and meals/day, while also helping to inform and arrange for access to COVID-19 vaccines through multiple approaches in some of the most underserved communities in the region. Approaches to facilitating vaccine access were largely chosen by HDM leadership based on past experiences with outreach in these communities.

The OA found that nearly 3 out of 4 HDMs provided some type of direct assistance to their clients to help them get vaccinated. This impressive feat speaks to the capacity and ability of the HDM network to mobilize resources quickly and expand their meal services to include other services such as timely facilitation of vaccine access, especially among their homebound clients.

On the whole, local HDMs serve a wide range of groups, and were able to adapt/expand their services during the COVID-19 pandemic. These expanded efforts in LAC were nearly a third in volume as the efforts led by Area Agencies on Aging in California overall (California Department of Aging [CDA], 2021, 2022; Trailblazer Research, 2020, see Supplemental Table-A). Generally, compared with smaller programs, larger programs served more meals overall, and provided more services to communities of color and low-income populations. They typically have greater capacity to serve higher volume of meals to more diverse clienteles.

Table 1. Program and Clientele Characteristics: Results From an Organizational Assessment of 34 Home Delivered Meals Programs in Los Angeles County, March–April 2022.

	All Organizations (<i>n</i> = 34)		Small Organizations (<25 Staff) (<i>n</i> = 20) ^a		Large Organizations (≥25 Staff) (<i>n</i> = 14)		Significance Test ^b T-test or Fisher's exact <i>p</i> -value
	Total; Mean ± SD or <i>n</i>	Range or % ^c	Total; Mean ± SD or <i>n</i>	Range or % ^c	Total; Mean ± SD or <i>n</i>	Range or % ^c	
Number of clients served per week	24,995; 735.1 ± 1684.8	(33– 9500)	3440; 172.0 ± 157.9	(33–540)	21,555; 1539.6± 2446.2	(80– 9500)	0.0568
Number of meals served per day	19,511; 573.8 ± 768.4	(9–2600)	3694; 184.7 ± 277.6	(9–1080)	15,817; 1129.8± 905.6	(176– 2600)	0.0019*
Provider type							
Government	10	29.4	4	20.0	6	42.9	0.2522
Nonprofit	23	67.6	15	75.0	8	57.1	
Other	1	2.9	1	5.0	0	0.0	
Number of staff in organization							
Fewer than 25	20	58.8	—	—	—	—	—
25 to 99	5	14.7	—	—	—	—	—
100 to 199	3	8.8	—	—	—	—	—
200 to 999	5	14.7	—	—	—	—	—
1000 or more	1	2.9	—	—	—	—	—
Unsure	0	0.0	—	—	—	—	—
Change in service catchment area since beginning of COVID-19 pandemic							
Stayed the same	18	52.9	12	60.0	6	42.9	0.3818
Increased in size	15	44.1	8	40.0	7	50.0	
Decreased in size	1	2.9	0	0.0	1	7.1	
Populations served (estimated percentages) ^d							
Low-income	54.9 ± 36.2	(0–100)	42.7 ± 36.7	(0–99)	72.5 ± 28.1	(0–100)	0.0154*
Communities of color	42.5 ± 35.1	(0–100)	28.6 ± 30.2	(0–99)	62.4 ± 32.6	(0–100)	0.0039*
Children (ages 0–4 years)	0.3 ± 1.7	(0–10)	0 ± 0	(0–0)	0.7 ± 2.7	(0–10)	0.3356
Children (ages 5– 17 years)	0.3 ± 1.7	(0–10)	0 ± 0	(0–0)	0.7 ± 2.7	(0–10)	0.3356
Adults (ages 18– 30 years)	0.3 ± 1.1	(0–5)	0.5 ± 1.4	(0–5)	0.1 ± 0.5	(0–2)	0.3787
Adults (ages 31– 64 years)	11.0 ± 12.5	(0–50)	12.2 ± 12.5	(0–45)	9.4 ± 12.9	(0–50)	0.5240
Adults (ages ≥65 years)	81.4 ± 25.3	(0–100)	74.9 ± 29.8	(0–100)	90.6 ± 13.1	(50–100)	0.0449*
Individuals with disabilities	37.4 ± 33.9	(0–100)	34.4 ± 37.1	(0–99)	41.8 ± 29.7	(0–100)	0.5406
Persons experiencing homelessness	3.1 ± 6.3	(0–25)	2.4 ± 6.0	(0–25)	4.0 ± 6.8	(0–25)	0.4753
Other	7.2 ± 22.7	(0–90)	4.5 ± 17.9	(0–80)	11.1 ± 28.6	(0–90)	0.4153
Estimated percentage of clients who are homebound ^e (<i>n</i> = 33)	76.8 ± 27.9	(0–100) ^f	82.4 ± 27.4	(0–100)	69.1 ± 27.8	(30–100)	0.1827

Note. COVID-19 = Coronavirus Disease 2019; SD = standard deviation. **p* < .05.

^aOrganizations with <25 staff (*n* = 20) were included in this category. Some organizations declined to answer the estimated percentage of homebound clients, leaving a sample size for this question of *n* = 19.

^bSignificance test *p*-value reflects differences between small and large organizations.

^cTotal percentages may not sum to 100% due to rounding.

^dMultiple response options allowed; therefore, total percentages may exceed 100%.

^eEstimated based on the participating organizations' individual definition of "homebound"; 33 organizations responded to this inquiry about homebound clients.

^fOne organization switched to "Grab and Go" (pick-up) meals temporarily during the COVID-19 pandemic.

The present study has several limitations. First, the assessment survey was conducted at an organizational level; as such, its modest sample size limited how the data were analyzed. Second, social desirability bias was likely present and

may have influenced how HDM representatives responded to survey questions. Third, clientele vaccination status was obtained via HDM representatives' recall/best estimates versus by directly reviewing the clients' records; thus, the OA was

Table 2. Frequency of Encountering Clients Who Use Medical Resources That are Associated With Being Homebound: Results From an Organizational Assessment of 34 Home Delivered Meals Programs in Los Angeles County, March–April 2022.

	Never		Rarely (1–10%)		Sometimes (11–50%)		Frequently/ Most of the time (51–99%)		Always (100%)	
	Total		Total		Total		Total		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Frequency of encountering clients who use the following ^{a,b}										
At-home ESRD dialysis	13	38.2	17	50.0	4	11.8	0	0.0	0	0.0
In-facility ESRD dialysis services	10	29.4	11	32.4	12	35.3	1	2.9	0	0.0
At-home hospice services	7	20.6	15	44.1	12	35.3	0	0.0	0	0.0
BiPAPs	18	52.9	11	32.4	5	14.7	0	0.0	0	0.0
Ventilators	22	64.7	10	29.4	2	5.9	0	0.0	0	0.0
Cardiac devices	15	44.1	11	32.4	8	23.5	0	0.0	0	0.0
Electric beds	4	11.8	19	55.9	10	29.4	1	2.9	0	0.0
Enteral feeding	25	73.5	9	26.5	0	0.0	0	0.0	0	0.0
Home health services	3	8.8	13	38.2	13	38.2	5	14.7	0	0.0
IV Infusion pumps	20	58.8	14	41.2	0	0.0	0	0.0	0	0.0
Motorized wheelchairs or scooters	1	2.9	15	44.1	16	47.1	2	5.9	0	0.0
Oxygen services	4	11.8	16	47.1	14	41.2	0	0.0	0	0.0
Oxygen concentrators	13	38.2	14	41.2	7	20.6	0	0.0	0	0.0
Suction pumps	23	67.6	11	32.4	0	0.0	0	0.0	0	0.0

Note. ESRD = End-Stage Renal Disease; BiPAP = bi-level positive airway pressure; IV = intravenous.

^aRow percentages may not sum to 100% due to rounding.

^bThese medical services and devices may not be mutually exclusive (i.e., the same client may use multiple medical services and devices listed in the table).

Table 3. Assistance With Obtaining the COVID-19 Vaccine and the Vaccination Status of 34 Home Delivered Meals Programs' Homebound Clients, Los Angeles County, March–April 2022.

	All Organizations (<i>n</i> = 34)		Small Organizations (<25 Staff) (<i>n</i> = 20) ^a		Large Organizations (≥25 Staff) (<i>n</i> = 14) ^b		Significance Test ^c
	Total; Mean ± SD or <i>n</i>	Range or % ^d	Total; Mean ± SD or <i>n</i>	Range or % ^d	Total; Mean ± SD or <i>n</i>	Range or % ^d	
Estimated percentage of clients who are homebound ^e (<i>n</i> = 33)	76.8 ± 27.9	(0–100) ^f	82.4 ± 27.4	(0–100)	69.1 ± 27.8	(30–100)	0.1827
Assistance with obtaining the COVID-19 vaccine, provided by organization to homebound clients ^g							
Providing information to clients about where they can get vaccinated	25	73.5	14	70.0	11	78.6	0.7041
Organizing and providing transportation to and from vaccination provider sites	13	38.2	6	30.0	7	50.0	0.2962
Organizing mobile vaccine clinics or events	18	52.9	8	40.0	10	71.4	0.0921
Arranging in-home vaccinations	15	44.1	7	35.0	8	57.1	0.2960
Not applicable—have not assisted clients	6	17.6	5	25.0	1	7.1	0.3636
Other	1	2.9	0	0.0	1	7.1	0.4118
Vaccination status of homebound clients (estimated percentages) ^h (<i>n</i> = 29)							
Partially vaccinated	10.7 ± 21.1	(0–100)	10.9 ± 24.5	(0–100)	10.5 ± 17.0	(0–50)	0.9593
Weighted ⁱ	13.3 ± 531.4		19.1 ± 442.6		12.5 ± 637.0		

(continued)

Table 3. (continued)

	All Organizations (n = 34)		Small Organizations (<25 Staff) (n = 20) ^a		Large Organizations (≥25 Staff) (n = 14) ^b		Significance Test ^c T-test or Fisher's exact p-value
	Total; Mean ± SD or n	Range or % ^d	Total; Mean ± SD or n	Range or % ^d	Total; Mean ± SD or n	Range or % ^d	
Fully vaccinated (3rd/booster dose has not been given yet)	37.2 ± 36.3	(0–100)	33.8 ± 39.1	(0–100)	41.4 ± 33.6	(0–100)	0.5823
Weighted ⁱ	24.9 ± 854.5		37.7 ± 502.1		23.2 ± 1160.8		
Received booster or additional dose	46.3 ± 39.4	(0–100)	52.3 ± 41.6	(0–100)	38.8 ± 36.9	(0–95)	0.3698
Weighted ⁱ	58.3 ± 1124.2		40.6 ± 527.3		60.8 ± 1588.5		
Unvaccinated	5.9 ± 11.8	(0–60)	3.1 ± 4.7	(0–15)	9.3 ± 16.5	(0–60)	0.2083
Weighted ⁱ	3.4 ± 230.6		2.5 ± 43.5		3.5 ± 348.6		
Basis for percentage estimates of vaccination status (total n = 29)							
Program information/data	5	17.2	3	18.8	2	15.4	0.9510
An educated guess	12	41.4	6	37.5	6	46.2	
Both	8	27.6	5	31.3	3	23.1	
Other	4	13.8	2	12.5	2	15.4	
Desired help from local health organizations to assist homebound clients with obtaining the COVID-19 vaccine and with other COVID-19 services ^g							
Connect meal programs with entities hosting mobile vaccine clinics	14	41.2	8	40.0	6	42.9	1.0000
Connect meal programs with entities providing in-home vaccinations	21	61.8	12	60.0	9	64.3	1.0000
Provide meal programs with personal protective equipment	21	61.8	12	60.0	9	64.3	1.0000
Provide meal programs with COVID-19 tests (test kits)	22	64.7	13	65.0	9	64.3	1.0000
Provide safety guidance and implement public health policies	22	64.7	13	65.0	9	64.3	1.0000
Other	3	8.8	2	10.0	1	7.1	1.0000

Note. COVID-19 = Coronavirus Disease 2019; SD = standard deviation.

^aOrganizations with <25 staff (n = 20) were included in this category. Some organizations declined to answer the estimated percentage of homebound clients and the vaccination status questions, leaving a sample size for those questions of n = 19 and n = 16, respectively.

^bOrganizations with ≥25 staff (n = 14) were included in this category. One organization declined to answer the vaccination status questions, leaving a sample size for those questions of n = 13.

^cSignificance test p-value reflects differences between small and large organizations.

^dTotal percentages may not sum to 100% due to rounding.

^eEstimated based on the participating organizations' individual definition of "homebound"; 33 organizations responded to this inquiry about homebound clients.

^fOne organization switched to "Grab and Go" (pick-up) meals temporarily during the COVID-19 pandemic.

^gMultiple response options allowed; therefore, total percentages may exceed 100%.

^hIndividual organizations' responses for the four categories summed to 100%. Partially vaccinated: Have received the first dose but not the second dose of an mRNA vaccine (Pfizer, Moderna). Fully vaccinated: Have received two doses of the mRNA vaccine (Pfizer, Moderna) or one dose of the Johnson & Johnson (J&J) vaccine. Boosters are for those who are not immunocompromised and additional doses are for those who are immunocompromised (e.g., third dose of Pfizer, Moderna, or J&J, or second dose of any of the three for those whose first dose was J&J).

ⁱThe weighted means and standard deviations of percentages in each vaccination category were calculated using the number of clients served per week as the weighting variable.

unable to clearly demonstrate the effectiveness of HDM efforts in improving COVID-19 vaccine rates. Finally, to mitigate a conflict of interest involving MOW West—a HDM that could benefit financially from favorable survey results—DPH asked its Data Science Team to independently serve as the "external

evaluator," since the team was not directly funded to perform the assessment nor to deliver meals.

Study findings suggest that, in collaboration with DPH and AD, LAC's HDMs were able to successfully engage and assist older homebound individuals with obtaining the

COVID-19 vaccine. This promising public-nonprofit/not-for-profit partnership has the potential to further expand, and to serve as a model of practice for present and future efforts to deliver and improve the uptake of COVID-19 and other communicable disease vaccines in this hard-to-reach population. Providing direct assistance to improve vaccination uptake, for example, could be a viable approach for achieving this larger goal.

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Author Contributions

D. Guglielmo collected, analyzed, and interpreted the data. She drafted the first version of the article. J. Cloud, L.V. Smith, and T. Kuo conceptualized the study. They supervised and assisted with the data analysis design and interpretation of the data. L. Trejo and C. Baca facilitated the outreach to the 34 home delivered meals programs that participated in the project. R. Shetgiri provided technical support to the project's implementation. All authors revised the article for intellectual content.

Declaration of Conflicting Interests

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Human Subjects Protection

As there were no human subjects involved in the organizational needs assessment, this project was considered exempt from full review by the Los Angeles County Department of Public Health Institutional Review Board (IRB No. 2002-02-989).

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Supplemental Material

Supplemental material for this article is available online.

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