

Lead-Based Paint and Other In-Home Health Hazards in Las Vegas, Nevada: Findings of the Las Vegas Lead Hazard Control and Healthy Homes Program

Daidre Gamboa
Casey Barber, MPH
Erin Sheehy, MPH
Selam Ayele
Shawn L. Gerstenberger, PhD
*Department of Environmental
and Occupational Health
School of Public Health
University of Nevada, Las Vegas*

Abstract The outcomes of the Las Vegas Lead Hazard Control and Healthy Homes Program (Las Vegas LHCHHP) are characterized in this article by the prevalence, type, and location of lead-based paint and healthy homes hazards. A total of 62 participants were recruited for our program from residents of Las Vegas, Nevada, and were enrolled from 2018 until March 2020 according to U.S. Department of Housing and Urban Development requirements. Participants received a combined lead inspection and risk assessment, as well as a healthy homes visual assessment if lead-based paint hazards were identified. Occupant and housing characteristics were also recorded. The majority of Las Vegas LHCHHP housing units had ≥ 1 lead dust hazard, and most had ≥ 1 lead-based paint hazard on a variety of components. Domestic hygiene and structural issues were the most frequently identified healthy homes hazards. Lead-based paint and other health hazards were common in Las Vegas LHCHHP housing. Our findings could inform future occupant education and lead hazard control and healthy homes programs in other jurisdictions.

Introduction

Health and safety hazards in housing remain significant public health concerns, particularly for vulnerable populations such as children, who spend 80–95% of their time inside their homes (Breyse & Gant, 2017; U.S. Department of Health and Human Services, 2019). A myriad of adverse health consequences have been linked to dilapidated housing conditions, including elevated blood lead levels, exacerbated asthma, and numerous types of injury (Sokolowsky et al., 2017; Srinivasan et al., 2003).

Exposure to lead-based paint in homes constructed prior to 1978 poses multiple hazards to children, usually via inhalation of lead dust, ingestion of lead paint chips, or both.

Blood lead concentrations of <10 $\mu\text{g}/\text{dL}$ have been associated with behavioral issues, cognitive impairment, and neurological damage (Council on Environmental Health, 2016; Mankikar et al., 2016). There is no safe level of exposure to lead. In 2021, the Centers for Disease Control and Prevention (CDC, 2022) updated its blood lead reference value to 3.5 $\mu\text{g}/\text{dL}$ for children. This level of exposure can still have adverse effects on IQ, academic performance, and ability to pay attention (CDC, 2022). Related negative developmental and learning outcomes include attention deficit hyperactivity disorder (ADHD), attention deficit disorder (ADD), lower birth weight, and lower IQ in children. Blood lead concentrations of >100 $\mu\text{g}/\text{dL}$ have severe health

consequences, including encephalopathy and even death (Council on Environmental Health, 2016).

Housing deficiencies can also contribute to asthma development and exacerbation. In the U.S., asthma is recognized as the most common chronic illness among children, affecting 1 in 15 individuals (Mankikar et al., 2016). Asthma has multiple in-home triggers, including mold, excess moisture, dust, pests, and tobacco smoke that stays on carpets or clothing (Breyse & Gant, 2017; Mankikar et al., 2016). Low-income individuals, racial and ethnic minorities, and people who live in the central area of a city where older housing stock is more prevalent, seek hospital care more frequently than do other populations (Mankikar et al., 2016).

Injuries in the home can be caused by numerous health and safety hazards and include falls, burns, fires, and unintentional poisonings (Mankikar et al., 2016). Further, structural issues such as cracks in walls, holes in ceilings, peeling paint, or leaking pipes can also contribute to health issues for occupants and their children (Srinivasan et al., 2003).

Lead Hazard Control and Healthy Homes Grants

The Office of Lead Hazard Control and Healthy Homes within the U.S. Department of Housing and Urban Development (HUD) has long worked to prevent lead poisoning and address multiple health and safety hazards with its Lead Hazard Control and Healthy Homes Grants for state and local governments (Breyse & Gant, 2017; HUD, 2009). HUD (2009) estimates that due to this initiative, approximately 70% of learning dis-

abilities attributed to childhood lead poisoning cases have been reduced.

Lead and healthy homes hazards are systematically identified in program-qualified housing by grantee personnel before remediation plans are developed and implemented. Assessment approaches include environmental sampling, building performance testing, resident interviews, and visual assessment. In 2018, the City of Las Vegas Office of Community Services, with the University of Nevada, Las Vegas as a subgrantee, was awarded a HUD Lead Hazard Control and Healthy Homes Grant. Known as the Las Vegas Lead Hazard Control and Healthy Homes Program (Las Vegas LHCHHP), the initiative enrolled 62 homes through March 2020.

Demographics and Housing Characteristics of Las Vegas

According to the U.S. Census Bureau (2021) and the City of Las Vegas 2015–2020 Consolidated Plan, Las Vegas is home to >645,000 residents and is the most densely populated city in Nevada. In terms of race and origin, 58.5% of Las Vegas residents identify as White, 33.2% identify as Hispanic or Latino, 12.1% identify as Black or African American, 6.7% identify as Asian, 1.0% identify as American Indian and Alaska Native, <1.0% identify as Native Hawaiian and Other Pacific Islander, and 8.2% report being two or more races (U.S. Census Bureau, 2021). Of 211,690 households within the city limits, 81,930 (39%) reported having an income <80% of the area median income (City of Las Vegas, 2015).

According to City of Las Vegas 2015–2020 Consolidated Plan estimates, there are similar numbers of owner- and renter-occupied housing units built before 1980 (26,529 and 26,585, respectively). Over 50% of both owner- and renter-occupied housing had children present in the home. Approximately 30% of Las Vegas households faced housing issues including substandard housing conditions, overcrowding, and housing cost burden in 2015. Nearly 1,800 households reported issues with plumbing or kitchen facilities. Overcrowding, defined as having 1.01–1.50 persons per room, was identified in 4,180 renter-occupied households and 1,195 owner-occupied households; severe overcrowding, defined as ≥ 1.51 individuals per room, was identified in 240 owner-occupied households and 1,970 renter-occupied

households. Housing cost burden of >50% of household income was reported by 18,760 renter-occupied households and 15,675 owner-occupied households, and there were 1,775 renter-occupied households and 910 owner-occupied households that were zero- or negative-income (City of Las Vegas, 2015).

Study Contributions

As the first HUD-funded Lead Hazard Control and Healthy Homes Grant within the city limits of Las Vegas, the Las Vegas LHCHHP was able to provide updated and more detailed information about the quality of qualified low-income housing stock in Las Vegas. The analysis of program findings here also offers additional insight into the types and locations of lead-based paint and other health and safety hazards throughout the participating homes.

Methods

Recruitment Methods

The Las Vegas LHCHHP was restricted to homes within Las Vegas city limits, with priority given to homes with children <5 years. We used a variety of recruitment methods to spread program awareness and enroll participants into the program, including door-to-door canvassing of target ZIP Codes (i.e., 89101, 89106, 89107, and 89108), posting on the City of Las Vegas website, news media outlets, community outreach events, and mailing letters to homeowners. The primary and most effective recruitment method was the mailing of letters to homeowners and property owners.

Participants interested in the program completed a prequalification intake form to determine initial eligibility based on their estimated household income, construction year of their home, location, and if they had a pregnant individual and/or any children <6 years living in or visiting the home frequently. If a participant prequalified for the program based on this information, an application would be mailed, emailed, or dropped off at their home, depending on the occupant's preference. Program staff were then readily available to address any questions, concerns, or scheduling requests for application processing appointments. All study activities, including the consent process, were approved by the University of Nevada, Las Vegas Institutional Review Board (Protocol #1128104).

Enrollment Requirements

To be enrolled in the program, the housing unit had to be a permanent structure within the City of Las Vegas and built prior to 1978, as verified by the Clark County Assessor's records. For an owner-occupied home, the household had to have a pregnant individual or a child <6 years who lived in or visited the home frequently. Verification of each child's age (e.g., birth certificate, immunization record, or visiting child form), applicant's identification (e.g., driver's license or passport), and income verification of all occupants ≥ 18 years (e.g., recent pay stubs, Social Security income statements, unemployment benefits) were required. Applicants also had to provide evidence of homeowners or renters insurance where applicable, and they had to acknowledge receipt and understanding of the U.S. Environmental Protection Agency's Renovate Right educational brochure regarding safe renovation procedures in pre-1978 housing.

Complete applications with agreement to the Las Vegas LHCHHP terms and conditions were required to qualify. Applicants living in rental properties also needed to provide a copy of their rental agreement as well as identification for all persons on that agreement. Rental properties were not required to have a child <6 years and/or a pregnant individual living there, but the property owner did have to agree to rent their home for 3 years to a low-income family. Once the application and all required documents were obtained, the final qualification for the program was based on calculation of the household's total income by household size using HUD income standards.

Lead Inspection and Risk Assessment

Once a participant qualified for the program, a lead inspection and risk assessment (LIRA) was scheduled. This surface-by-surface inspection of all interior and exterior painted surfaces involved testing with a Viken Pb200i portable X-ray fluorescence (XRF) analyzer. Inspection is conducted by lead risk assessor staff who are certified by the U.S. Environmental Protection Agency. Dust and soil sampling were also conducted in addition to an inspection of the building conditions. HUD standards were used to identify hazards from lead dust and soil sampling results once they were analyzed by a laboratory that was accredited by the National Lead Laboratory Accreditation Program. Once deteriorated

paint with a concentration of ≥ 1.0 mg of lead/cm² was identified by the XRF analyzer, the hazard was flagged, and a photograph was taken. The lead concentration, location, component, paint color, and paint condition were all noted in the XRF.

The visual assessment of healthy homes hazards was contingent on identification of ≥ 1 lead-based paint hazard during the lead inspection and risk assessment. The Las Vegas LHCHHP visual assessment tool was based on the 29 hazard categories of the Healthy Homes Rating System (HHRS), though the HHRS scoring system was not utilized per HUD guidance. Instead, each hazard example within the 29 hazard categories was ranked as good, concern, take action, or not applicable for all rooms and accessible exterior areas of the home. Items in good condition were not considered to be hazards. Hazards that were ranked as a concern or take action were documented with a photo for the edification of the resident and/or homeowner, and the take action hazards were prioritized for future program remediation.

All findings of the lead inspection and risk assessment and healthy homes visual assessment were compiled in informative reports provided to the resident and/or homeowner and the City of Las Vegas. All program files were maintained on a secure server.

Inclusion and Exclusion Criteria

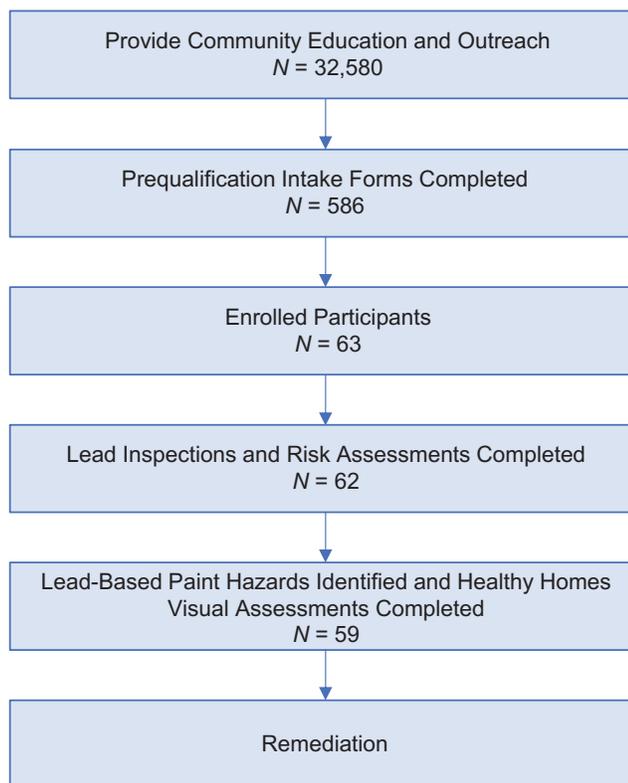
In order to be included in the subsequent analyses, Las Vegas LHCHHP participants had to have consented to participate in the research study. As informed consent could be provided only in-person by English-speaking participants, vacant units and Spanish-speaking primary participants ($N = 19$) were excluded from these data analyses. Thus, a total of 43 homes were included in our study. An additional four homes were excluded from the healthy homes visual assessment analysis due to fundamental changes in the visual assessment tool in the first quarter of the Las Vegas program.

Data Analysis

Descriptive statistics were obtained throughout the grant for the purpose of tracking project progress. Here, more complete descriptive assessments of participant demographics and income, housing characteristics, lead dust hazards, and types of components with lead-

FIGURE 1

Participation From Outreach Through Remediation of Lead-Based Paint and Healthy Homes Hazards in Housing in the Las Vegas Lead Hazard Control and Healthy Homes Program



based paint hazards were obtained. Additional analysis considered the occurrence of each hazard category by location in the home (i.e., kitchen, bedroom, bathroom, other, and exterior). All analyses were performed using SPSS Statistics version 26.

Results

Recruitment and Enrollment

The program distributed 32,580 educational and outreach materials in the Las Vegas community. During these outreach attempts, 586 interested participants completed the prequalification intake form. From those interested participants, 63 completed the application, provided the required documents, qualified for the program, and were enrolled. A total of 62 lead inspection and risk assessments and 59 subsequent healthy homes visual assess-

ments were completed through March 2020 (Figure 1). This article includes data from 43 lead inspection and risk assessments and 39 healthy homes visual assessments.

Included participant demographics and housing characteristics are shown in Table 1. The majority (76.7%) of included Las Vegas LHCHHP primary participants ($n = 43$) self-identified as female, with a similar majority of female head-of-household (74.4%). Most primary participants identified as African American (39.5%) or White (34.9%) while 6.9% identified as another race. Additionally, 51.2% of primary participants identified as Hispanic or Latino. The median participant age was 46 years.

Per HUD requirements, all household incomes were within 80% of the federal poverty level by household size, and approximately 28% were considered extremely low-income,

TABLE 1

Occupant and Housing Characteristics of Participants of the Las Vegas Lead Hazard Control and Healthy Homes Program (N = 43)

Occupant Characteristic	# (%)
Female head of household	
Yes	32 (74.4)
No	11 (25.6)
Race of primary participant	
White	15 (34.9)
African American	17 (39.5)
Other	3 (7.0)
Did not answer	8 (18.6)
Ethnicity of primary participant	
Hispanic or Latino	22 (51.2)
Not Hispanic or Latino	21 (48.8)
Household income *	
30% of the federal poverty level (extremely low)	12 (27.9)
50% of the federal poverty level (very low)	7 (16.3)
80% of the federal poverty level (low)	24 (55.8)
Housing Characteristic	# (%)
ZIP Code	
89101	6 (14.0)
89106	11 (25.6)
89107	16 (37.2)
89108	6 (14.0)
Other	4 (9.2)
Unit type	
Rental	7 (16.3)
Owner-occupied	36 (83.7)
Decade of construction	
1940–1949	2 (4.7)
1950–1959	10 (23.3)
1960–1969	27 (62.8)
1970–1979	4 (9.3)
Household size	
1–3	23 (53.5)
≥4	20 (46.5)

* Based on requirements of the U.S. Department of Housing and Urban Development.

which is defined as a household income at 30% of the federal poverty level. The median household income was \$34,997.56, and most households had 1–3 residents; there were no pregnant individuals included in our study.

Properties were primarily owner-occupied (83.7%) and built between 1950 and 1969 (87.1%), with the average year of construction being 1961. The median area of the included homes was 1,320 ft².

Lead Hazards

The frequency of houses with lead dust hazards on windowsills and on floors is shown in Table 2. In the 43 homes that were assessed, windowsill lead dust hazards were more common than floor lead dust hazards. Overall, 38 total windowsill lead dust hazards were identified compared with 14 total floor lead dust hazards. Notably, there were two homes that each had 4 windowsill lead dust hazards and there was another home that had 5 floor lead dust hazards. There were no soil hazards identified.

A variety of housing components in participant homes were found to have lead-based paint hazards (Table 3). In total, 859 lead-based paint hazards were identified; the majority of units had at least one identified lead-based paint hazard in each of the component categories. Nearly 63% of units had ≥1 lead-based paint hazard on a wall, ceiling, or floor component, and 40 of 43 units (93%) had a miscellaneous component with a lead-based paint hazard. Overall, we identified 198 wall, ceiling, or floor component lead-based paint hazards, ranging from 0 to 55 hazards in each unit. The number of homes with no hazard in a given component category skewed the results so much that average results were not meaningful.

Healthy Homes Hazards

Over 6,500 instances of healthy homes hazards (categorized as concern or take action) by location in the unit were identified in the 39 units with healthy homes visual assessments (Table 4). Domestic hygiene issues ($n = 1,030$) and structural problems ($n = 1,412$) were the most commonly identified healthy homes hazards across all locations of the units. Falls on level surfaces were also prevalent in these units, with 655 identified trip-and-fall hazards. By location, bedrooms ($n = 1,984$) and other rooms ($n = 1,805$) had the highest hazard counts. The highest single hazard count was for structural issues in bedrooms ($n = 386$).

Discussion

As the first Lead Hazard Control and Healthy Homes Grant-funded program in the City of Las Vegas, study findings from the program offer valuable and novel information about in-home health hazards in Southern Nevada. Hazards including lead-

based paint, asthma triggers, and/or injury risks were identified in most homes, and our findings provide additional insight about the types and locations of these hazards. Our results can inform the activities of future Lead Hazard Control and Healthy Homes Grants as well as other programs intended to identify and address hazards and deficiencies in older and low-income housing. Wider dissemination of these findings can also facilitate regional comparisons of pre-1978 housing conditions.

The occupant and housing characteristics presented here were largely representative of all Las Vegas LHCHHP enrollees and reflect target enrollment groups for HUD-funded Lead Hazard Control and Healthy Homes Grants. A higher proportion of primary participants were African American, Hispanic, or Latino compared with the City of Las Vegas as a whole. Most included properties were located in the 89106 and 89107 ZIP Codes, reflecting where the most Las Vegas LHCHHP recruitment letters were mailed. Homes in the City of Las Vegas that were included were typically larger by square footage and number of rooms compared with homes previously enrolled in the neighboring City of Henderson during the 2013–2016 Henderson Lead Hazard Control and Healthy Homes Program (Henderson LHCHHP).

Comparison of Henderson LHCHHP and Las Vegas LHCHHP findings offers one example of how even seemingly similar neighboring communities have different housing and occupant characteristics. By the conclusion of the Henderson LHCHHP in 2016, 79% of enrolled units had lead-based paint hazards (Sokolowsky, 2017), whereas 98% of all Las Vegas LHCHHP units had lead-based paint hazards through March 2020. While household sizes were similar, participants in the two programs differed in terms of income distribution, race, and ethnicity; Henderson LHCHHP participants predominantly were White, non-Hispanic or Latino, thus largely reflecting the demographics of the City of Henderson. Another contrast was that the Las Vegas LHCHHP had more owner-occupied units (83.7%) than did the Henderson LHCHHP (28.3%).

Understanding the types and locations of lead-based paint, dust, and soil hazards in qualified housing informs community-level educational efforts and supports the utility

TABLE 2

Lead Dust Hazards Identified During Lead Inspection and Risk Assessment Visits for the Las Vegas Lead Hazard Control and Healthy Homes Program (N = 43)

Lead Dust Hazard Location *	Frequency	Homes # (%)
Windowsill (≥100 µg/ft ² of lead)	0	20 (46.5)
	1–2	19 (44.2)
	≥3	4 (9.3)
Floor (≥10 µg/ft ² of lead)	0	37 (86.0)
	≥1	6 (14.0)

* According to 2019 lead dust standards from the U.S. Department of Housing and Urban Development.

TABLE 3

Housing Components Identified to Have Lead-Based Paint Hazards in the Las Vegas Lead Hazard Control and Healthy Homes Program (N = 43)

Component	Homes With Hazards # (%)	Total Hazards # (Range)
Door (doors, stops, jambs, casings, steps, security doors, door knockers, doorbells)	25 (58.1)	109 (0–23)
Window (casings, sills, frames, aprons, shutters, security bars)	26 (60.5)	188 (0–37)
Roof (fascia, flashing, soffit, soffit supports, beams, gutters)	20 (50.0)	180 (0–23)
Walls, ceilings, and floors (interior and exterior walls, ceilings, foundation, floors, trim, baseboards, vents)	27 (62.8)	198 (0–55)
Miscellaneous (shelves, shelf supports, cabinets, light fixtures, vents, electrical boxes, pipes, water spigots, support columns and attachments, fences, railings, house numbers)	40 (93.0)	184 (0–15)

Note. Lead-based paint hazards were measured by X-ray fluorescence analysis.

of current HUD guidelines for conducting combined lead inspection and risk assessments. The importance of lead dust sampling persists, as the majority of included Las Vegas LHCHHP homes had at least one lead dust hazard. Study findings from Las Vegas LHCHHP are consistent with a study by Jacobs et al. (2002) that found 16% of housing units in the U.S. had ≥1 lead dust windowsill or lead dust floor hazard and much fewer (5%) had lead soil hazards. Jacobs et al. (2002) further estimated that

25% of all U.S. dwellings have either deteriorated lead-based paint hazards, lead dust, or lead in the soil.

These study findings also demonstrate the necessity of testing all painted surfaces in homes, as a variety of individual components were identified as lead-based paint hazards. The high prevalence of lead-based paint hazards on doors, windows, and other components for the Las Vegas LHCHHP housing was consistent with findings by Rufin (2015) for the Henderson LHCHHP. Testing all com-

TABLE 4

Healthy Homes Hazard Frequency by Room in Housing in the Las Vegas Lead Hazard Control and Healthy Homes Program (N = 39)

Category	Bathroom	Bedroom	Kitchen	Exterior	Other
Asbestos, silica, and MMF	2	83	11	9	66
Biocides	33	9	36	8	30
Carbon monoxide	0	5	16	22	37
Collision and entrapment	17	60	17	33	32
Crowding and spacing	3	30	1	4	25
Damp and mold growth	107	51	38	60	60
Domestic hygiene	157	356	116	140	261
Electrical hazards	55	157	52	63	93
Entry by intruders	24	71	36	17	53
Excess cold	35	92	32	4	104
Excess heat	44	105	36	4	105
Explosions	1	2	1	13	19
Falls in baths	104	0	0	0	0
Falls on level surfaces	73	195	60	113	214
Fire	23	153	78	1	122
Flames and hot surfaces	12	13	2	3	10
Food safety	0	0	5	0	1
Lighting	23	65	1	6	56
Noise	5	19	9	21	17
Operability of amenities	28	88	25	11	53
Personal hygiene	9	1	19	0	1
Structural	190	386	120	334	382
Uncombusted fuel gas	0	1	5	7	13
Volatile organic compounds	78	42	42	58	51
Water supply	27	0	6	2	0

Note. Excludes lead, radon, falling on stairs, and falling between levels. MMF = manufactured mineral fibers.

ponents can be particularly relevant in older housing, where repairs and renovations over time can replace select components while leaving other related surfaces behind.

For example, Las Vegas LHCHHP risk assessors routinely found a door had been replaced, but that original door jambs, stops, frames, or casings were left in place. This consideration is essential for surfaces that are frequently subject to deterioration from impact and/or friction. Another important consideration is the lead-based paint hazard burden of the oldest housing units: one Las Vegas LHCHHP home built in the 1940s had >100 lead-based paint hazards.

At the time of submission no other Lead Hazard Control and Healthy Homes Grant had published findings about the frequencies of healthy homes hazards by in-home location. Some of our findings are straightforward by design (e.g., hazards involving falls in bathtubs and showers were restricted to bathrooms). Other findings, however, highlighted the possibility of hazards across multiple locations in the home, such as hazards related to domestic hygiene, falls, electricity, fire, and structural issues that were found throughout the homes. Even volatile organic compounds were observed across all location categories. Observing these healthy homes hazards

throughout homes underscores the importance of thorough visual assessments and occupant education about these types of hazards, particularly for the most at-risk residents.

Strengths

As previously mentioned, our study of the Las Vegas LHCHHP findings offer a better understanding of Las Vegas's diverse and low-income resident population and the condition of the housing units in which they live. The novel presentation of results here provides more detail about types and locations of hazards; this information can inform future program activities, community education efforts, and even program guidance for future grantees. After initial refinement of the Las Vegas LHCHHP healthy homes visual assessment, tools and measurement equipment were used consistently throughout the course of the program, facilitating these comparisons across housing units. Our findings also highlight the importance of following HUD guidelines for identification of lead-based paint, dust, and soil hazards to prevent children of current and future residents from being exposed to lead.

Another unique strength of the Las Vegas LHCHHP was its ability to not only identify these hazards but also coordinate remediation, thus improving the condition of vulnerable housing stock. The assessment and remediation of lead-based paint and other healthy homes hazards simultaneously amplifies the lasting impact of these improvements, as many hazards examined occur together and are related (e.g., a water leak contributing to lead-based paint deterioration, structural issues, and mold growth).

Outreach and recruitment efforts by Las Vegas LHCHHP also extended community education efforts regarding lead-based paint and other in-home health hazards, fostering community partnerships, and building rapport with interested potential participants. As the program required significant participant time and involvement, these relationships were essential. Our study is descriptive in nature to fill an existing gap in the available literature and data about in-home hazards in Southern Nevada.

Limitations

There were, however, limitations of our study and of the Las Vegas LHCHHP. First, for the

purposes of our study, Las Vegas LHCHHP staff were unable to obtain informed consent from Spanish-speaking residents. Enrollment was limited, by design, to follow HUD requirements and was not representative of all housing units in the City of Las Vegas, but our studying findings did provide valuable insight about the older and lower-income housing stock at highest risk of having lead-based paint and multiple other home health hazards. These factors, combined with the timeline of the Las Vegas LHCHHP, limited the overall sample size included in our study, which precluded more complex statistical analyses. Our study was cross-sectional due to program design, and there will be no long-term follow-up data about the health and housing outcomes for participants.

Conclusion

From 2018–2020, the HUD-funded partnership between the City of Las Vegas and the University of Nevada, Las Vegas—known as the Las Vegas Lead Hazard Control and Healthy Homes Program—enrolled qualifying homes and participants in the program to identify numerous in-home health hazards, including lead-based paint and dust hazards. Our analysis of the program findings provides additional information about the types and locations of prevalent hazards in program housing. Furthermore, our results can inform future housing programs and community education efforts. 🏠

Acknowledgements: This work was supported by the HUD Office of Lead Hazard

Control and Healthy Homes (grant number NVLHB0652-17). The authors acknowledge the support and guidance of the HUD Office of Lead Hazard Control and Healthy Homes, as well as its commitment to lead-safe, healthy housing throughout the U.S. The authors also acknowledge the participation of program enrollees and the support of community partner organizations throughout the Las Vegas LHCHHP. Lastly, the authors thank Melissa Marshall for her time editing the final draft of this manuscript.

Corresponding Author: Shawn L. Gerstenberger, School of Public Health, University of Nevada, Las Vegas, 4700 South Maryland Parkway, Suite 335, Las Vegas, NV 89119-3063. Email: shawn.gerstenberger@unlvedu.

References

Breyse, P.N., & Gant, J.L. (2017). The importance of housing for healthy populations and communities. *Journal of Public Health Management and Practice*, 23(2), 204–206. <https://doi.org/10.1097/PHH.0000000000000543>

Centers for Disease Control and Prevention. (2022). *Blood lead levels in children*. <https://www.cdc.gov/nceh/lead/prevention/blood-lead-levels.htm>

City of Las Vegas, Office of Community Services. (2015). *City of Las Vegas 2015–2020 Consolidated Plan & Action Plan*. <https://files.lasvegasnevada.gov/community-services/Las-Vegas-HUD-Cosolidated-Plan-2015-2020.pdf>

Council on Environmental Health. (2016). Prevention of childhood lead toxicity. *Pediatrics*, 138(1), e20161493. <https://doi.org/10.1542/peds.2016-1493>

Jacobs, D.E., Clickner, R.P., Zhou, J.Y., Viet, S.M., Marker, D.A., Rogers, J.W., Zeldin, D.C., Broene, P., & Friedman, W. (2002). The prevalence of lead-based paint hazards in U.S. housing. *Environmental Health Perspectives*, 110(10), A599–A606. <https://doi.org/10.1289/ehp.021100599>

Mankikar, D., Campbell, C., & Greenberg, R. (2016). Evaluation of a home-based environmental and educational intervention to improve health in vulnerable households: Southeastern Pennsylvania Lead and Healthy Homes Program. *International Journal of Environmental Research and Public Health*, 13(9), Article 900. <https://doi.org/10.3390/ijerph13090900>

Rufin, K.G.A. (2015). *Lead hazard control in Henderson, Nevada: Identifying critical areas and the associated costs* [Master’s thesis, University of Nevada, Las Vegas]. UNLV Theses, Dissertations, Professional Papers, and Capstones. <http://dx.doi.org/10.34917/7646039>

Sokolowsky, A., Marquez, E., Sheehy, E., Barber, C., & Gerstenberger, S. (2017). Health hazards in the home: An assessment of a southern Nevada community. *Journal of Community Health*, 42(4), 730–738. <https://doi.org/10.1007/s10900-016-0311-6>

Srinivasan, S., O’Fallon, L.R., & Dearry, A. (2003). Creating healthy communities, healthy homes, healthy people: Initiating a research agenda on the built environment and public health. *American Journal of Public Health*, 93(9), 1446–1450. <https://doi.org/10.2105/ajph.93.9.1446>

U.S. Census Bureau. (2021). *QuickFacts: Las Vegas city, Nevada*. <https://www.census.gov/quickfacts/lasvegascitynevada>

U.S. Department of Health and Human Services, Office of the Surgeon General. (2019). *Healthy homes reports and publications*. <https://www.hhs.gov/surgeongeneral/reports-and-publications/healthy-homes/index.html>

U.S. Department of Housing and Urban Development, Office of Healthy Homes and Lead Hazard Control. (2009). *Leading our nation to healthier homes: The Healthy Homes Strategic Plan*. https://www.hud.gov/sites/documents/DOC_13701.PDF

Did You Know?

October 13 is Children’s Environmental Health Day. The Children’s Environmental Health Network established the observance to increase the visibility of children’s environmental health issues and empower action. Learn more at <https://cehday.org>.