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Cardiovascular Risk and Pain Burden as Emerging Priorities in San Francisco Homeless Health: Evidence From a Preliminary Field Report

Authors & Affiliations:

- *Sarah Jean Valliant** (affiliation: San Francisco State University, Valliant Foundation)
- *Ileana Rodriguez* (affiliation: San Francisco State University, Valliant Foundation)
- *Angelina Ka Lee* (affiliation: San Francisco State University, Valliant Foundation)
- *Rianna Rose Punzalan* (affiliation: Skyline College, Valliant Foundation)
- *Logan Charles Holbrook* (affiliation: San Francisco State University, Valliant Foundation)
- *Raquel Juliette Tamayo* (affiliation: San Francisco State University, Valliant Foundation)
- *Roxanne Carlos Mendoza* (affiliation: San Francisco State University, Valliant Foundation)
- *Senior Author* (affiliation: San Francisco State University, Valliant Foundation)
- Corresponding Author: *Sarah Jean Valliant,* email: [valliantfoundation@gmail.com]

Highlights

- Hypertensive Crisis prevalence: 10.17% (N=6) of usable BP ratios (N=59) met the criteria for Hypertensive Crisis or Higher (SYS ≥180 OR DIA ≥120).
- Overall prevalence of High Blood Pressure (Stage 1 or higher): 72.88% (N=43) of usable BP ratios (N=59), representing a pervasive, unmanaged health condition.
- Elevated Mean Cardiac Activity: The calculated Mean Heart Rate was 96 (N=65 usable entries), with a Median Heart Rate of 96, suggesting chronic stress or underlying conditions.
- High Chronic Pain Burden: 19.70% (N=13) of participants reported severe pain scores between 7 and 10 (N=64 usable scores after transformation).
- Demographic Context: The cohort included 70 usable total responses with a mean age of 42.95 years. Sex distribution records 55 male and 13 female entries.

Abstract

Objective: This preliminary public health report was conducted as a community needs assessment to quantify the acute and chronic health burdens—specifically demographics, cardiovascular status, and pain—among an unsheltered population. The findings were intended to guide operational decisions regarding medical referrals, targeted health education, and service prioritization for a non-profit organization. Additionally, these data establish a foundational evidence base to inform the Valliant Foundation's future systematic reviews and meta-analyses on cardiovascular risk factors in unsheltered populations. The assessment, governed by an independent ethics committee determination, prioritized participant well-being with a protocol for capacity and immediate intervention for medical emergencies.

Methods: Data was collected from 72 total responses via a field questionnaire framed strictly as a needs assessment, not research. Clinical metrics included blood pressure (BP), heart rate (HR), and pain scores. Data were analyzed descriptively. Usable samples included 59 BP ratios, 65 heart rates, and 66 pain scores (after transformation: 0→1 and >10→10). Standard guidelines were applied to classify BP, including the threshold for Hypertensive Crisis (SYS ≥180 or DIA ≥120).

Results: The cohort was predominantly male (53 of 68 defined entries), with an Age Range of 24 to 70, a Mean Age of 42.96 years, and a Median Age of 41 years (N=70). The population was primarily White/Caucasian (30 entries) and Black/African American (29 entries). Cardiovascular findings demonstrated significant acute risk: 72.88% (N=43 of 59) of usable BP readings were classified as Total High Blood Pressure. Crucially, 10.17% (N=6) of usable BP readings met the criteria for Hypertensive Crisis or Higher, with documented examples including 210/137 and 286/127. Furthermore, the average cardiac activity was elevated, with a Mean Heart Rate of 96 and a Median Heart Rate of 96 (N=65). Chronic symptom burden was also high; the Mean Pain Score was 3.74, and 19.70% (N=13) of participants reported severe pain scores between 7 and 10.

Conclusion: The findings identify an urgent and significant prevalence of acute cardiovascular risk factors, particularly severe hypertension, within this unsheltered community. This descriptive data confirms the immediate need for enhanced medical outreach, specialized health screenings, and targeted resource allocation for medical referrals, simultaneously providing critical preliminary metrics for future, hypothesis-driven epidemiological research in this vulnerable population.

Introduction

Background

The unsheltered and homeless community is globally recognized as a population facing extreme health disparities, often characterized by premature mortality and high rates of hypertension, congestive heart failure myocardial infarctions, and other chronic diseases with poor cardiovascular outcomes coupled with limited access to continuous medical care. [1,3] Nationally, individuals experiencing homelessness have mortality rates three to four times higher than the general population, with cardiovascular disease identified as one of the leading causes of death within this group. [2]

Despite growing literature on health disparities, few studies have quantified acute cardiovascular risk factors using field-based clinical measurements among unsheltered adults. Existing studies rely on self-reported health measures or retrospective data, while field-based data can directly quantify cardiovascular risk factors. Field-based measurements will reflect the immediate needs of unsheltered adults to address a critical gap in knowledge for public health surveillance and intervention planning and resource allocation.

Cardiovascular disease prevalence among people experiencing homelessness has been found to affect these individuals with increased risks for mortality at disproportionate levels when compared to housed populations. Reasons for this disparity include heightened lifestyle risk factors such as stress, smoking, illicit drug use, and a lack of overall health maintenance, coupled with the difficulty of identifying or diagnosing cardiovascular disease in unsheltered adults and subsequently providing the appropriate interventions, treatment, and management of disease [6]. Poor management of cardiovascular disease can

lead to devastating health outcomes such as acute cardiovascular events like myocardial infarctions (MI), cerebrovascular accidents (CVA), and even premature death. A report by the National Academies of Sciences, Engineering, and Medicine identified poor social health as a significant contributor to cardiovascular disease (CVD) risk, associated with a one-third increase in CVD incidence and a fourfold relative increase in the risk of mortality, hospitalization, and emergency department visits. [11].

Pain is often recognized as a subjective symptom yet growing evidence indicates it is a risk factor for cardiovascular morbidity. Chronic pain and multisite pain have been identified as contributors to adverse cardiovascular outcomes [4], supported by recent findings that chronic and multisite pain were strongly associated with cardiovascular events of MI and CVA; incidents of MI occurring at a rate of 1.48 per 1000 person-years and CVA occurring at a rate of 0.86 per 1000 person-years [5].

Objectives

This preliminary public health report was strictly conducted as an Operational Needs Assessment for the Valliant Foundation, not a research project, as determined by an independent ethics committee. The primary objective was to acquire a holistic understanding of the baseline health status, acute risk factors, and chronic symptom burden to ethically and effectively guide the non-profit's operational strategies. The specific objectives of this assessment were to:

1. Quantify Acute Cardiovascular Risk: To measure and describe the prevalence of acute and potentially life-threatening cardiovascular risk factors—specifically BP and HR [8]—among the unsheltered community to inform the urgency of medical referrals and the implementation of the Emergency Action Protocol.
2. Characterize Chronic Symptom Burden: To quantify the prevalence and severity of chronic pain within the cohort, using transformed pain scores, to prioritize resource allocation toward pain management and quality-of-life interventions, as the presence of severe pain can have negative impacts on cardiovascular status. [7].
3. Establish a Demographic and Health Profile: To describe the basic demographic profile (age, gender, race/ethnicity) of the participants to ensure future outreach efforts, educational materials, and service designs are appropriately targeted and culturally competent.
4. Establish a Foundational Evidence Base: To establish preliminary, descriptive health metrics that can inform the Valliant Foundation's future systematic reviews and meta-analyses and provide critical data for future, hypothesis-driven epidemiological research partnerships focused on cardiovascular risk factors in this vulnerable population.

Rationale

To reduce health inequalities within the homeless community, outreach programs need to acquire a holistic understanding of the baseline health status, acute risk factors, and chronic health burden. This public health report provides a multi-metric health assessment conducted within a local homeless outreach initiative to produce data that will strengthen and guide future intervention and prevention strategies. A critical finding demonstrates that homeless adults have the highest rates of smoking, cocaine use, and suboptimal control of cardiovascular risk factors [2], highlighting their vulnerability to preventable health outcomes. Illustrating this foundational data enables prioritization of medical referrals, health education, and advocacy efforts to ensure resources are allocated toward individuals facing the highest cardiovascular risk.

Drawing from the compiled data of 72 participant responses, this provided valuable measurement for a focused clinical profile based on three metrics: heart rate (HR), blood pressure (BP), and pain scores. BP and HR values serve as real-time detection for life threatening cardiovascular instability and physiological

function while pain scores serve as a subjective screening of experienced distress. Readings from the BP responses of anything over 180/120 mm Hg informs outreach staff of hypertensive-related emergencies and urgent intervention to prevent risk of stroke or heart attack. HR provides real-time information of extreme or irregular heart rates, reflecting the body's current physiological state. If the recording of the HR value indicates an abnormal heart rate, this can lead to various health problems, including cardiovascular disease, stroke, heart failure, etc, and suggest immediate attention to stabilize abnormal measurements. [9]
Lastly, pain scores based on a 1-10 scale, showcase the level of urgent attention needed based on the numerical value, even if the vital signs appear exceptionally normal. Collectively, all these metrics inform volunteers to provide referrals, activate emergency response systems, and provide education in a professionally time-efficient manner.

Methodology

Ethical Oversight and Project Definition

This report summarizes data collected through a community needs assessment conducted by the Valliant Foundation's outreach program. The activity was strictly defined as an Operational Needs Assessment, not a research project, with the sole purpose of gathering descriptive data to guide non-profit operational decisions regarding resource prioritization, referrals, educational materials, and services.

Prior to commencement, the project underwent review by an independent ethics committee which determined the activity to be Non-Human Subjects Research (NHSR). The operational protocol emphasized strict adherence to participant autonomy and well-being. The assessment's goal was descriptive, focusing on characterizing a situation to improve services, rather than testing a hypothesis to create generalizable knowledge.

Study Setting and Participants

The assessment was conducted in San Francisco, California from November 2024 to September 2025 as part of regular outreach activities targeting the unsheltered community. Specific San Francisco communities that were serviced included the Inner Mission District, Tenderloin, and the Embarcadero. Data was only collected during daylight hours and in good weather conditions to ensure environmental factors did not create an undue burden on cardiovascular status. A total of 72 responses were obtained for demographic metrics and vital signs.

Capacity Screening

Volunteers were instructed to proceed only if the individual was Alert and Oriented (A&O x4)—able to state their name, location, approximate time/day, and explain the purpose of the assessment (e.g., "You're asking questions to help your organization").
Exclusion Criteria with a "Hard Stop" protocol was implemented to ensure participants provided clear, voluntary, and informed consent and had the capacity to participate. The assessment was immediately discontinued if the individual appeared disoriented, confused, exhibited severely disorganized speech, appeared to be in a state of acute psychosis or severe paranoia, under the acute influence of illicit drugs, or showed signs of severe intoxication that prevented understanding. Participants could withdraw consent at any time without penalty.

Eligibility Criteria

Strict eligibility criteria were applied to ensure the safety of all participants, as well as to maintain the integrity and operational utility of the collected data. These criteria were designed to minimize potential risks, reduce variability introduced by confounding factors, and ensure that the study population was appropriately representative of the target group for which the findings are intended.

Inclusion criteria required participants to demonstrate sufficient capacity and orientation to engage meaningfully and provide informed consent in the survey. Participants were eligible for inclusion if they demonstrated alertness and orientation to person, place, time, and situation (A&O x4) with verbal consent obtained by the participant after any outstanding questions were answered.

Exclusion criteria implemented protects prospective participants and the volunteer team from potential harm and to uphold ethical standards. Individuals lacking decision making capacity were excluded, as were those who withdrew or refused to proceed at any point in the encounter. Individuals displaying alterations in mental status or under the apparent influence of drugs or alcohol were excluded due to lack of capacity or inability to provide informed consent. Stably housed individuals were also not eligible for participation.

Inclusion	Exclusion
Capacity and Orientation: The individual is Alert and Oriented (A&O x4), meaning they can state their name, location, approximate time/day, and can explain the purpose of the assessment back to the volunteer (e.g., "You're asking questions to help your organization")	Lack of capacity
Voluntary and Informed Consent: The individual is informed about the survey and explicitly provides verbal consent to participate	Refusal/Withdrawal: The individual does not consent to start or wishes to stop at any time.
Stability (Implied): The person is stable and, if previously identified with a medical concern, gives explicit consent to continue after services were offered and declined.	Severe Intoxication/Psychosis: Presenting with severe intoxication, under the acute influence of illicit drugs, or showing signs of acute psychosis, severe paranoia, or severely disorganized speech that prevents understanding.
Experiencing homelessness (as defined by lack of fixed, regular, and adequate nighttime residence)	Stably Housed

Figure 1. Flow of Participant Screening, Inclusion, and Exclusion Based on Eligibility Criteria.

Verbal Consent

Prior to data collection, volunteers read a Verbal Information & Consent Script confirming the activity was a needs assessment, not research. Participants were assured that participation was completely voluntary, that they could stop at any time, and that their decision would not affect access to food or supplies. All answers were recorded anonymously, with no names collected. Consent was obtained verbally after any questions were answered.

Data Collection

The questionnaire collected demographic data (age, gender, race/ethnicity), two physiological metrics and one subjective metric: blood pressure, heart rate, and pain score, respectively.

Data was collected across the Inner Mission, Tenderloin, and Embarcadero neighborhoods of San Francisco, California. Outreach team members then approached participants and obtained informed consent, ensuring participants appeared alert, oriented, and had capacity.
Physiological measures were collected using FDA-cleared medical supplies including automated wrist sphygmomanometers and finger pulse oximeters. BP monitoring devices used include the G.Lab automatic blood pressure cuff and the Omron digital blood pressure cuff. Fingertip pulse oximeter devices used are the CVS brand finger pulse oximeter. All devices were inspected for functionality to ensure accuracy of vital signs measured and the safety of participants. Data was collected under the supervision of licensed medical professionals who oversaw the use of these devices and ensured proper use of devices were followed throughout the study.

In addition to physiological measures, subjective reporting of pain was collected utilizing the Numeric Pain Rating Scale (NPRS). The NPRS is utilized as a standardized tool to assess pain intensity. Participants were asked to rank their current pain levels on a scale of 1 to 10. Although common practices used in clinical healthcare settings do include the ranking of “0” and participants may state a number greater than “10”, any rate provided as “0” will be transformed to “1” and any numerical value reported by a participant greater than 10 will be transformed to “10” for data analysis purposes.

To minimize literacy bias, surveys were administered orally to participants by members of the research team.

Emergency Response Protocol

The protocol placed participant well-being as the first priority. Specific Medical Red Flags were defined, including blood pressure where systolic is >180 or diastolic is >120 [16]. If a red flag was identified, the assessment was paused, and the participant was calmly informed of the potential danger. Immediate help was offered, such as calling 911. Volunteers documented the vital sign and the action taken (e.g., "BP 210/137. Offered to call 911; person declined"), and participants' autonomy to decline services was respected.

If participants disclosed suicidal or homicidal ideation during any point during the survey, volunteers were trained to evaluate level of risk and to dial 911 of the person was deemed to be an iminent risk to themselves or others within the next 24h. If a person was deemed to have an A&O status less than 4, volunteers are directed to activate the emergency response system by dialing 911.

Statistical Methods Data Processing

All statistical analyses were performed using Microsoft Excel (Office 365), and some graphs were created in R studio. Data were first screened for completeness and accuracy. Entries missing critical values, such as blood pressure measurements recorded as a single number (without a systolic/diastolic ratio), were omitted from analysis. Pain scores listed as ranges were standardized by selecting the highest reported value. Any pain scores recorded as “0” were converted to “1” to align with the validated 1–10 pain scale. Likewise, any score reported to be above “10” was converted to “10”.

For descriptive statistics, the mean, median, and range were calculated for continuous variables, including age, heart rate, systolic blood pressure, diastolic blood pressure, and pain score. The frequency and percentage distributions were computed for categorical clinical parameters, specifically heart rate and blood pressure categories based on established clinical thresholds.

Heart rates were categorized as: Bradycardia: <60 beats per minute (bpm), Normal: 60–100 bpm, Tachycardia: >100 bpm,

Blood pressure was classified according to the American Heart Association (AHA) guidelines: Normal: Systolic <120 mmHg and Diastolic <80 mmHg; Elevated: Systolic 120–129 mmHg and Diastolic <80 mmHg; Hypertension, Stage 1: Systolic 130–139 mmHg or Diastolic 80–89 mmHg; Hypertension, Stage 2: Systolic ≥140 mmHg or Diastolic ≥90 mmHg; Hypertensive Crisis (Emergency): Systolic >180 mmHg and/or Diastolic >120 mmHg; Hypotension: Systolic <90 mmHg or Diastolic <60 mmHg. Percentages of participants within each blood pressure and heart rate category were calculated relative to the total number of valid entries. The Numerical Rating Scale (NRS) was used to measure the intensity of pain, a validated and widely used tool for pain assessment that can be administered verbally or visually based on patient self-report (Vaidya et al., 2021). The standard NRS ranges from 0 (“no pain”) to 10 (“worst pain imaginable”). For analytic consistency in our dataset, all reported zeros were recorded to ones, resulting in a modified scale ranging from 1 to 10. Pain levels were categorized as mild (1–4), moderate (5–6), and severe (7–10). [10].

All results were summarized descriptively to guide operational health priorities rather than inferential conclusions. Graphical representations were generated using statistical visualization software to illustrate demographic distributions and clinical patterns. Given that this analysis was conducted as a community needs assessment and not human subjects research, no hypothesis testing, regression modeling, or inferential statistics were performed.

Demographic Data

Out of 72 surveys, a total of 70 responses provided quantifiable ages, which were used to calculate the Mean Age (42.96 years) and Median Age (41 years). The Age Range was 24 to 70.

Heart Rate (HR)

Analysis began with 71 total entries. Six entries were excluded, including five non-numeric or unavailable entries ("na," "NA") and one physiological outlier exceeding the upper limit (825). The final set of 65 quantifiable entries (ranging from 55 to 130) was used to calculate the Mean Heart Rate (96) and Median Heart Rate (96.5).

Blood Pressure (BP)

Analysis began with 69 total entries. Ten entries were excluded due to being non-reads, ambiguous, or deemed physiological outliers (e.g., 120/172). The resulting 59 usable BP ratios were classified using standard medical guidelines:

Results

Data from the community needs assessment provided a total of 72 responses, of which 70 were included in the demographic analysis after data cleaning. Physiological and subjective metrics yielded usable

sample sizes ranging from N = 59 to N = 70, following the application of predefined data cleaning and transformation protocols.

Demographics

Demographic information was collected from 72 total participants. Among the 68 responses where gender was explicitly defined, the cohort was predominantly male: 53 participants (73.6%) identified as male, 15 (20.8%) as female, and 4 (5.6%) had missing or undefined gender information.

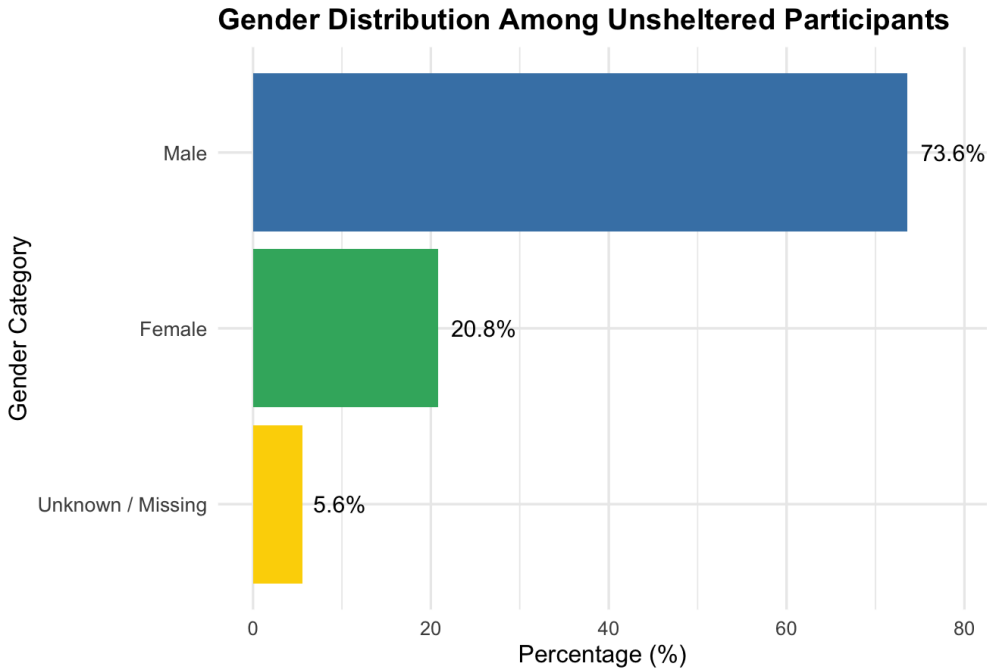

Figure 2. Gender Distribution Among Unsheltered Participants.
The horizontal bar chart displays the gender composition of individuals included in the community needs assessment. Among the 72 participants, 53 (73.6%) identified as male, 15 (20.8%) as female, and 4 (5.6%) had missing or undefined gender information.

Age

A total of 70 responses provided quantifiable age data for analysis. Participant ages ranged from 24 to 70 years, with a mean age of 42.96 years and a median age of 41 years.

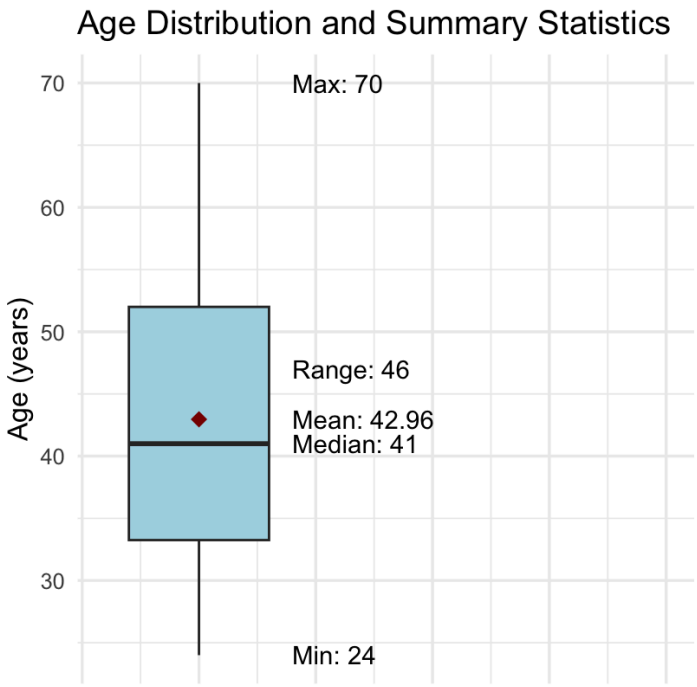

Figure 3. Age Distribution and Summary Statistics Among Unsheltered Participants.
The boxplot summarizes the age distribution of unsheltered participants included in the community needs assessment. Participant ages ranged from 24 to 70 years, with a mean age of 42.96 years and a median age of 41 years.

Race and Ethnicity

The study sample demonstrated racial and ethnic diversity. The majority of participants identified as White/Caucasian (N = 31) or Black/African American (N = 28). Smaller proportions of participants identified as Hispanic/Latino (N = 4), Indigenous/Native American (N = 2), or other/specific origins (N = 3). Data was missing or not available for 4 participants.

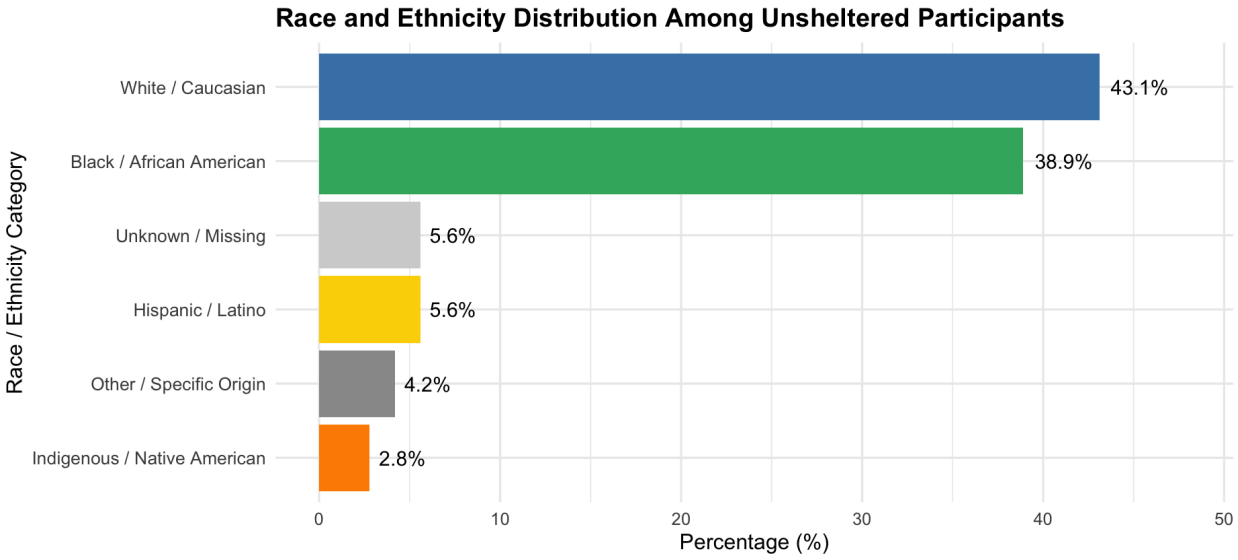

Figure 4. Race and Ethnicity Distribution Among Unsheltered Participants.
Horizontal bar chart illustrating the distribution of racial and ethnic identities among unsheltered participants. The majority identified as White/Caucasian (43.1%) or Black/African American (38.9%), with smaller populations identifying as Hispanic/Latino (5.6%), Indigenous/Native American (2.8%), or Other/Specific Origin (4.2%). Data were missing for four participants (5.6%).

Cardiovascular Metrics

Analysis of blood pressure began with 69 total data points. After excluding non-readings, ambiguous entries, and three physiological outliers (e.g., 120/172, 135/32), 59 usable BP ratios were retained for classification.

A substantial majority of participants presented with elevated or high blood pressure, Total High Blood Pressure (Hypertensive Stage 1 or Higher) had a total of 43 entries, representing 72.88% of the usable data points (N=59).

Across the Usable BP Ratios (N=59) The specific distribution across standard categories was as follows: Hypertensive Crisis or Higher: 6 entries (10.17%) met the threshold of SYS ≥180 OR DIA ≥120. These critical readings included 210/137, 286/127, 185/136, 193/140, 218/154, and 148/122. These findings triggered the Emergency Action Protocol outlined in the field guide. General Hypertensive (Stage 1 or 2): 37 entries (62.71%). Normal Range: 6 entries (10.17%). Elevated: 5 entries (8.47%). Hypotensive: 5 entries (8.47%).

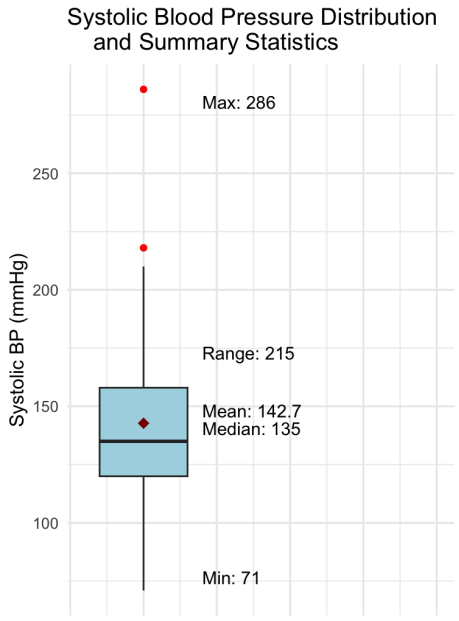

Figure 5. Systolic Blood Pressure Distribution and Summary Statistics Among Unsheltered Participants.
The boxplot summarizes the distribution of systolic blood pressure among participants after excluding non-readings, ambiguous entries, and physiological outliers. Systolic blood pressure values ranged from 71 to 286 mmHg, with a mean of 143 mmHg and a median of 135 mmHg.

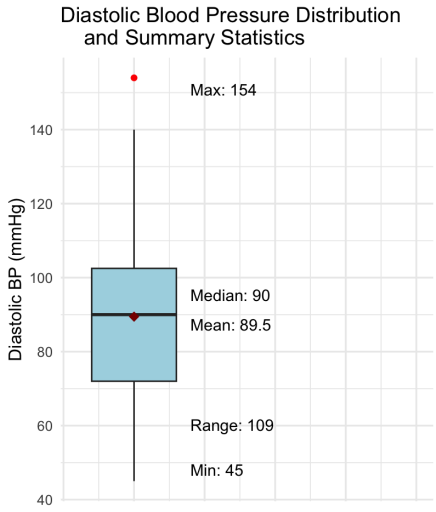

Figure 6. Diastolic Blood Pressure Distribution and Summary Statistics Among Unsheltered Participants. The boxplot summarizes the distribution of diastolic blood pressure among participants after excluding non-readings, ambiguous entries, and physiological outliers. Diastolic blood pressure values ranged from 45 to 154 mmHg, with a mean of 89 mmHg and a median of 90 mmHg.

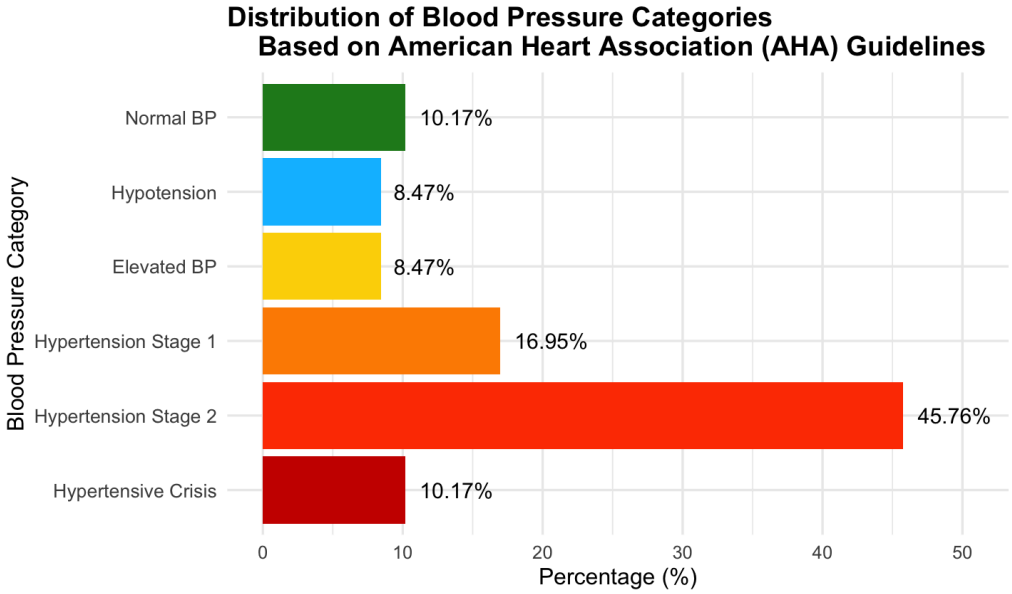

Figure 7. Distribution of Blood Pressure (BP) Categories Among Unsheltered Participants based on American Heart Association (AHA) Guidelines. Of the 72 total participants, 6 (10.17%) were classified as Normal, 5 (8.47%) as Hypotension, 5 (8.47%) as Elevated, 10 (16.95%) as Hypertension Stage 1, 27 (45.76%) as Hypertension Stage 2, and 6 (10.17%) as Hypertensive Crisis. Twelve participants had missing or unclassifiable readings.

Heart rate analysis utilized 65 quantifiable entries (ranging between 55 and 130) after six exclusions (five non-numeric and one outlier above 200). The central tendency metrics indicate elevated baseline cardiac activity in the cohort. The Mean Heart Rate was 98.16, Median Heart Rate was 96 and the range was found to be 55 to 130.

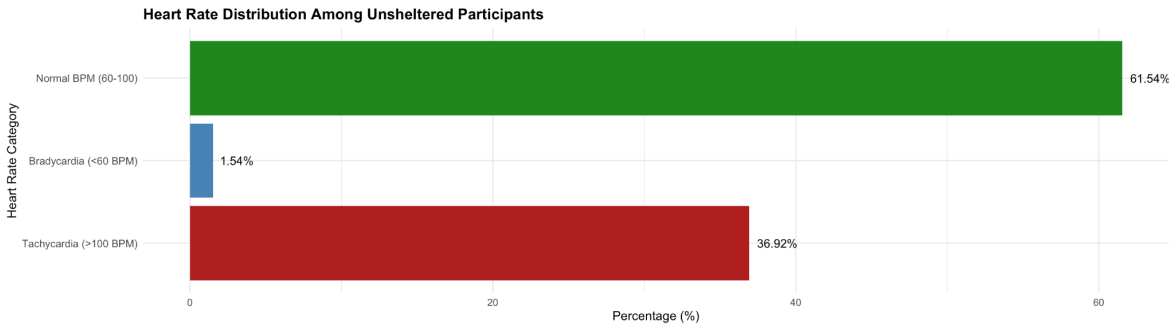

Figure 8. Distribution of Heart Rate Categories Among Unsheltered Participants.
The horizontal bar graph illustrates the distribution of heart rate categories among unsheltered participants. From the data, 40 participants (61.54%) had heart rates within the normal range (60-100 bpm), 24 participants (36.92%) exhibited tachycardia (>100 bpm), and 1 participant (1.54%) exhibited bradycardia (<60 bpm). Heart rate data were missing or unclassifiable for 7 participants.

Pain Score

Pain scale observations started with 68 total entries, resulting in 66 usable scores after transformation and exclusions. The transformation rules applied were: 0→1 (seven entries transformed) and >10→10 (one entry transformed). The Numerical Pain Rating Scale was applied, where volunteers instructed participants that "1" meant they were in no pain at all and "10" being the worst pain they have ever felt. Pain Score Metrics (N=66). The Mean Pain Score was 3.74, the Median Pain Score: 3.0 and the Pain Score Range was 1 to 10.

Chronic symptom burden was significant, with a substantial percentage reporting severe pain. Scores of 1 accounted for 23 entries (34.85%). Meanwhile, scores between 2 and 6 accounted for 30 entries (45.45%). Scores between 7 and 10 (Severe Pain) accounted for 13 entries (19.70%).

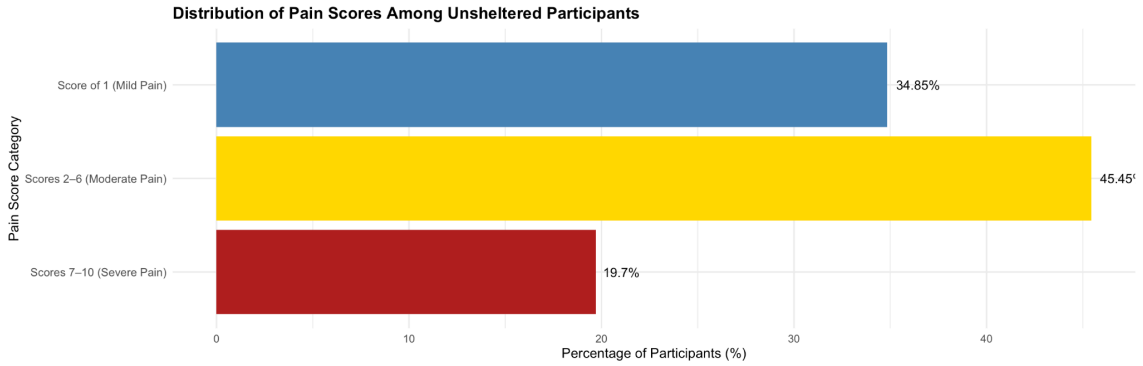

Figure 9. Distribution of Pain Scores Among Unsheltered Participants. The horizontal bar graph illustrates the distribution of pain scores among unsheltered participants. From the data, 23 participants (34.85%) had a mild pain score of 1, 30 participants (45.45%) had a moderate pain score between 2-6, and 13 participants (19.7%) reported having a severe pain score between 7-10. Pain score data were missing or unclassifiable for 6 participants.

Discussion

This descriptive public health report details the demographic and clinical health status of an unsheltered population, providing quantitative evidence of significant, acute, and often unmanaged health crises. Framed strictly as an Operational Needs Assessment (NHSR), the findings serve to justify the urgent expansion of medical outreach services and establish baseline metrics for subsequent, hypothesis-driven research.

Ethical Framing and Operational Necessity

A crucial element of this report is its foundation as a community needs assessment, not a research study. This approach was overseen by an independent ethics committee determination, confirming the status of NHSR. This ethical framework dictated the use of a stringent "Hard Stop" protocol, prioritizing participant well-being, capacity for informed consent, and autonomy over data collection. The primary utility of the data, therefore, is its direct application to the operational decisions of the Valliant Foundation, guiding the prioritization of referrals, educational materials, and services. By detailing the prevalence of critical medical conditions, this report fulfills the operational mandate to better understand community needs and justify resource allocation.

The Prevalence of Acute Cardiovascular Risk

The most compelling finding is the extremely high prevalence of severe cardiovascular risk factors, which warrants immediate clinical attention. Of the 59 usable BP ratios, a staggering 72.88% (N=43) were classified as Total High Blood Pressure (Hypertensive Stage 1 or higher). This suggests that hypertension is not a statistical anomaly but a dominant, pervasive medical condition within this cohort. The data was benchmarked against national and published rates to help assess the baseline ranges for the clinical values. Studies of adults report hypertension prevalence ranging between 135–55%, while national data for the general population of similar age (mean= 44 years) average around 47%. In contrast, the rate in this assessment 72.88% total high blood pressure and 10.17% in hypertensive crisis is markedly higher. Elevated cardiac activity supports this interpretation: the Mean Heart Rate of 96 bpm and 36.92% tachycardia rate significantly exceed expected norms (18–22%), suggesting chronic sympathetic activation and heightened stress response.

More alarmingly, 10.17% (N=6) of the usable readings met the criteria for Hypertensive Crisis or Higher (SYS ≥180 OR DIA ≥120). These critical measurements, which included values up to 286/127 and 218/154, necessitated the implementation of the Emergency Action Protocol outlined in the field guide, where participants were informed of the danger and offered immediate help, such as calling 911. The high rate of these extreme outliers strongly suggests that many unsheltered individuals are living with severe, untreated, or poorly managed hypertension, putting them at extreme risk for myocardial infarction, stroke, and kidney failure.

Furthermore, the assessment of heart rate revealed elevated baseline cardiac activity. The Mean Heart Rate (96) and Median Heart Rate (96) (N=65), with a maximum recorded rate of 130, are above healthy resting averages. This may be indicative of chronic physiological stress, anxiety disorders, or unmanaged pain, all of which are common comorbidities in the unsheltered population. The combined findings of

severe hypertension and elevated heart rate present a composite picture of imminent cardiovascular danger that must be urgently addressed by medical outreach programs.

Chronic Symptom Burden and Pain

Pain scores were subjective values reported by participants, adhering to the Numeric Pain Rating Scale (NPRS) scale of 1-10 to assess pain scale in the moment of the encounter between the participant and the volunteers collecting the survey. A transformation was utilized upon review of data to ensure the accuracy of descriptive statistics. The transformation protocol required any pain score reported as less than 1 such as the number “0” was transformed into “1” and any score >10 was transformed to “10”.
Applying this adjustment ensured that chronic pain prevalence was not underestimated and aligns with accepted outreach medicine practice emphasizing conservative interpretation of self-reported pain. Additionally, several entries illustrated the complexity of pain assessment in the field. For example, one participant who had recently been struck by a motorcycle reported a current pain score of six. This highlights the difficulty in distinguishing acute trauma from chronic pain, reinforcing the need for careful, ethically informed data collection. Values such as this one were not transformed, but it is worth noting that some values may be underrated due to feelings of burdensomeness or desensitization.

After transformations were applied and descriptive statistics were employed, a Mean Pain Score of 3.74 (N=65) was calculated. Notably, nearly one-quarter of the participants (19.70%, N=13) reported severe pain scores between 7 and 10. This high rate of severe pain underscores the chronic physical distress experienced by this population, which demands comprehensive pain management and referral services. Pain is a potential driver of elevated heart rate and complicates management of underlying conditions, providing a crucial intervention point for improving quality of life and cardiovascular health.

Demographic Context

The demographic profile, revealing a predominantly male cohort (55 entries) and a large concentration of middle-aged adults (Mean Age 42.96 years), is consistent with many national reports on unsheltered populations. The near-even split between White/Caucasian (30 entries) and Black/African American (29 entries) participants indicates the urgent necessity of developing culturally competent and equitable health interventions that address the unique needs and barriers faced by these two largest demographic groups.

Though demographic data collected demonstrates a comparable number of Black/African American and White identifying participants that are predominantly middle-aged and male, this demonstrates the intersection between race, gender, and health vulnerability. Public health data from San Francisco in 2024 revealed that 37% of unhoused adults identified as Black while only 5% of San Francisco residents are Black [12]. Data from this study supports overrepresentation of Black/African Americans experiencing homelessness in San Francisco established by existing demographic data about the unhoused population of San Francisco [13]. The high rates of untreated or inadequately managed hypertension observed in this study reflect a barrier that is unique to the unsheltered adult community as they often lack access to preventative care measures and treatment. Other considerations for overrepresentation of unhoused Black/African Americans when observing cardiovascular risks can be attributable to the history of fear and mistrust among Black/African Americans and the healthcare system, as it has been noted that stress

levels are correlated to levels of fear and mistrust in healthcare and these sentiments have been found to increase under unsheltered circumstances [14].

Recommendations For Program Improvement

As this was a pilot NHSR initiative, the findings strongly inform the design of future hypothesis-driven research.
Based on the pilot NHSR initiative findings, we strongly recommend increasing referrals to cardiovascular clinics for homeless individuals at higher risk, as well as conducting further NHSR analysis to better understand health risks within this population. These steps ensure improved preventative care and more effective future interventions.

Given the disproportionate amount of Black/African American participants facing burdensome BP and HR values, it is important to prioritize equity-centered approaches when considering interventions. This includes creating community engagement in outreach, training volunteers to understand biases and cultural humility to avoid dismission of symptoms, and on a grander scale proposing structural reforms that address systemic racism in housing and healthcare [15].

The documented high rates of Hypertensive Crisis (10.17%) and elevated heart rates establish a compelling rationale for subsequent, rigorous meta-analyses to investigate associations between housing status, chronic stress, pain burden, and cardiovascular outcomes in this community. The success in collecting and cleaning multi-metric data (with high usability rates for BP, HR, and pain scores) demonstrates the feasibility of executing more complex research protocols in a street-based setting.

Valliant Foundation translated these findings into concrete operational changes to boost emergency training protocols and field education. The 10.17% rate of BP readings classified as a hypertensive crisis urges the creation of dedicated emergency referrals and transportation funding to ensure immediate pathways to emergent medical care for critical cases. To maintain best-practices that align with clinical practices and protocols, it is advisable to retrain volunteers periodically to recognize hypertensive risk profiles and when to initiate referrals promptly during outreach. Such suggestions consolidate that the NHSR findings are not only descriptive but can be translated directly to practices and procedures to improve client safety and health outcomes.

Limitations

As an operational needs assessment, this report is subject to limitations inherent to field collection. It was conducted as a community needs assessment rather than a formal research study, meaning that data were gathered solely to guide operational decision-making and resource allocation for outreach activities within a specific unsheltered population. As such, the data are descriptive and non-inferential, designed to identify urgent health priorities rather than to generate statistically generalizable findings. These results

should not be interpreted as representative of the broader homeless population or as generalizable outcomes. The sample reflects individuals encountered during field operations within a defined geographic area and timeframe and is therefore inherently limited by selection bias and situational factors. Overall, these findings provide a clear snapshot of the community's immediate health needs. They are meant to guide short-term service delivery and shape future, more formal research studies, rather than to draw population-wide or epidemiological conclusions.

Capacity screening, while rigorous, cannot eliminate all cognitive barriers when answering questions about pain. Furthermore, the exclusion of nine BP entries (due to non-reads or physiological improbability) and six HR entries (non-reads or outliers) suggests inherent challenges in capturing precise physiological data in a non-clinical environment. However, the severity and volume of the remaining quantifiable high-risk findings (e.g., N=6 in Hypertensive Crisis) remain highly persuasive and mandate urgent operational response. Due to the nature of operational needs assessments and NHSR, inferential statistics such as hypothesis testing or regression modeling were intentionally not performed. The data cannot be treated as a randomized or generalizable sample, as the primary objective was operational decision making rather than statistical inference. Although reviewed and classified as Non-Human Subjects Research (NHSR), this assessment remains subject to limitations inherent to field-based data collection. Participation required individuals to be alert and oriented; therefore, those experiencing severe confusion, acute psychosis, or intoxication were excluded under the protocol. This necessary safeguard introduces potential selection bias and likely underestimates the true severity of the health crisis, as individuals with the greatest clinical instability were ethically ineligible to participate. Despite these challenges, participant safety and autonomy remained the top priority, reinforcing the appropriateness of the NHSR designation and demonstrating that ethical responsibility took precedence over data completeness.

Conclusion

This document serves as the final report of an Operational Needs Assessment conducted by Valliant Foundation, which was strictly determined by an independent ethics committee to be Non-Human Subjects Research (NHSR). The descriptive analysis of the cohort (N=72 total responses) establishes clear, urgent health priorities and confirms an "acute and ongoing medical 'silent emergency'" within the unsheltered community, necessitating immediate operational strategic planning.

The quantitative findings reveal a profound and unmanaged cardiovascular crisis. A critical 10.17% (N=6) of the 59 usable BP readings met the threshold for Hypertensive Crisis or Higher (SYS ≥180 or DIA ≥120). This extreme rate, underscored by documented critical values up to 286/127 and 218/154, validates the ethical requirement for the Emergency Action Protocol. Furthermore, the majority of the cohort, 72.88% (N=43) of usable BP readings, were classified as Total High Blood Pressure (Stage 1 or higher). This prevalence is markedly higher than published national and unsheltered norms, underscoring the pervasive nature of severe hypertension within this specific population.

Elevated cardiac activity (Mean Heart Rate 96 bpm) and high rates of Severe Pain (19.70%) serve as crucial indicators of chronic physiological stress and comorbidities that complicate underlying cardiovascular risk.

As an operational assessment, this descriptive data provides a compelling mandate for the Valliant Foundation to refine its future service delivery model. Based on these immediate and acute findings, the Foundation is ethically compelled to direct a significant portion of its resources toward establishing urgent medical referral pathways, securing transportation funds for participants presenting with blood pressure in the Hypertensive Crisis range or with severe general hypertension, and developing targeted outreach programs. These outreach initiatives should include culturally competent educational materials focusing on hypertension management, chronic pain, and stress reduction to address the prevalent clinical and symptomatic burdens identified in the data.

Ultimately, this NHSR initiative fulfills its strategic purpose: it successfully generated robust, multi-metric data while prioritizing participant autonomy and safety via the "Hard Stop" Protocol. This evidence demonstrates the feasibility of executing rigorous protocols in a street-based setting and provides critical preliminary metrics that establish a strong rationale for attracting partners interested in conducting formal, hypothesis-driven epidemiological research to address these stark health disparities. The findings will ensure that all future operational decisions are guided by data to maximize participant health and safety.

Other information

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The authors have no conflicts of interest to declare. Funding was not needed for this analysis. All medical supplies were provided by the Valliant Foundation.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the authors used NotebookLM in order to improve grammatical, spelling, and organizational clarity. After using this service, the authors reviewed and edited the content as needed and took full responsibility for the content of the published article.

References

1. Richards J, Kuhn R. Unsheltered homelessness and health: A literature review. AJPM Focus. 2022 Oct;2(1):100043.
2. Samhita Korukonda, Nikith Erukulla, Harris JR, Pranitha Kovuri, Wilcox KT. Cardiovascular disease burden in the homeless population. Open Heart [Internet]. 2025 Jan 1 [cited 2025 May 19];12(1):e003190–0. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12083296/
3. Wadhera RK, Khatana SAM, Choi E, Jiang G, Shen C, Yeh RW, et al. Disparities in Care and Mortality Among Homeless Adults Hospitalized for Cardiovascular Conditions. JAMA Internal Medicine. 2020 Mar 1;180(3):357.
4. Reynolds CA, Minic Z. Chronic Pain-Associated Cardiovascular Disease: The Role of Sympathetic Nerve Activity. International Journal of Molecular Sciences. 2023 Mar 11;24(6):5378–8.
5. Tian J, Zhou Y, Lin X, Jones G, Pan F. Multisite Pain and Myocardial Infarction and Stroke: A Prospective Cohort and Mendelian Randomization Analysis. JACC Advances [Internet]. 2023 May 1;2(3):100295. Available from: https://pubmed.ncbi.nlm.nih.gov/38939595/
6. Macklin J, Samson B, Zsager A, Ross H, Pinto A, Gibson JL. Cardiovascular disease management and healthcare delivery for people experiencing homelessness: a scoping review. BMC Health Services Research. 2024 Sep 17;24(1).
7. Varley AL, DeRussy AJ, Jones AL, Hoge A, Gordon AJ, Richman J, et al. The Association Between Chronic Pain, Substance use, and Primary Care Experience Among Veterans with Ongoing or Recent Homelessness. Journal of General Internal Medicine. 2024 Oct 15;
8. Surey J, Veitch M, Rogers S, Nader Al Shakarchi, Burridge S, Leonard M, et al. Cardiovascular Disease Screening in Individuals Who Are Unhoused: A Feasibility Study. Journal of the American Heart Association Cardiovascular and cerebrovascular disease. 2024 Apr 16;13(8).
9. IEEE Xplore Full-Text PDF: [Internet]. Ieee.org. 2025 [cited 2025 Oct 6]. Available from: https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10242090
10. Vaidya R, Washington A, Stine S, Geamanu A, Hudson I. The IPA, a Modified Numerical System for Pain Assessment and Intervention. JAAOS: Global Research and Reviews. 2021 Sep;5(9).
11. Achamyeleh Birhanu Teshale, Htet Lin Htun, Owen AJ, Danijela Gasevic, Aung, Fancourt D, et al. The Role of Social Determinants of Health in Cardiovascular Diseases: An Umbrella Review. Journal of the American Heart Association. 2023 Jun 22;12(13).
12. All Home. Racial Equity and Homelessness [Internet]. Available from: https://www.allhomeca.org/racial-equity-and-homelessness/
13. San Francisco Department of Homelessness and Supportive Housing. 2024 PIT Count Slide Brief [Internet]. 2024. Available from: https://media.api.sf.gov/documents/2024_PIT_Slide_Brief.pdf
14. Odoh C, Businelle MS, Chen T-A, Kendzor DE, Obasi EM, Reitzel LR. Association of Fear and Mistrust with Stress Among Sheltered Homeless Adults and the Moderating Effects of Race and Sex. J Racial Ethn Health Disparities. 2020 Jun;7(3):458-467. doi:10.1007/s40615-019-00674-w.
15. Hassen N, Lofters A, Michael S, Mall A, Pinto AD, Rackal J. Implementing anti-racism interventions in healthcare settings: a scoping review. Int J Environ Res Public Health [Internet]. 2021 Mar 15;18(6):2993. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8000324/
16. National Heart, Lung, and Blood Institute. High Blood Pressure [Internet]. Bethesda, MD: NHLBI; [cited 2025 Oct 7]. Available from: https://www.nhlbi.nih.gov/health/high-blood-pressure

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