

Assessing Systemic Barriers to Veteran Health Using Systems Thinking: Tools for Community Assessment and Action

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Abstract

Background: Despite decades of research and substantial federal investment, Veterans continue to experience disproportionate rates of suicide, substance use, and chronic disease. Communities striving to support Veteran wellness must learn how to leverage these research-based insights in their contexts yet often lack the tools to do so. Systems thinking visualizes interactions between parts of a system to better understand complex problems. Our objective was to develop systems-thinking tools that synthesize evidence to guide community action to promote Veteran health and safety.

Methods: A prior literature review identified community factors that impact Veteran health using the Vital Conditions framework. Working from this and other literature, we identified key system supports: policies, services, resources, and system practices supportive to Veteran health, along with system-wide characteristics and mental models. We developed two systems tools to visualize barriers and supports: causal loop diagrams—iteratively refined through focus groups and interviews with Veterans and Veteran-serving community members—which visualize feedback structures underlying major themes pertaining to Veteran health; and an iceberg model for systems thinking, which synthesizes these barriers according to relative difficulty of change. Leverage points, or system supports well-positioned to address iceberg barriers and disrupt feedback loops, were matched to iceberg levels.

Results: Causal loop diagrams supported dialogue around interconnected drivers of Veteran health, highlighting 14 feedback loops shaping system behavior. Key themes included health consequences of service, transition to civilian life, care-seeking and barriers to eligibility, and enrollment and utilization of healthcare services. The iceberg model highlighted 52 barriers that can serve as targets for change, and 93 leverage points were matched to those barriers across iceberg levels. Together, these tools are designed to support community-driven prioritization of action.

Conclusions: Our tools contribute to the narrow body of applied system dynamics approaches that support community understanding of drivers of complex challenges and equip them to take feasible steps to alter system behavior. By presenting evidence in accessible interactive formats, the tools support community-led cross-sector engagement and ideation of actions to improve Veteran health and safety.

Trial registration: This study did not involve human participants and therefore did not require trial registration.

BACKGROUND

In 2018, the rate of Veteran suicide was 1.5 times that of civilians (1, 2). Despite decades of investment in healthcare and public health initiatives, the disparity has continued to widen over time (2). The drivers of Veteran health, and access to healthcare, are complex and extend throughout a lifetime. Through their service, Veterans are exposed to a distinct set of physical, psychological, and environmental stressors that increase their risk for adverse health outcomes compared with the general population (3, 4). Stressors such as high physical fitness standards, overseas deployment, combat exposure, and contact with environmental toxins increase risk for a wide range of health impacts, including arthritis, diabetes, stroke, various cancers, and chronic obstructive pulmonary disease (COPD) (3, 4). Mental health conditions are also highly prevalent; an estimated 43% of Veterans experience depression, PTSD, or substance use disorders (5).

These health consequences can emerge or worsen during an already vulnerable period: the transition from active duty to civilian life (6). Generally recognized as spanning the first 12 months post-discharge, the transition period encompasses a convergence of stressors, including adapting to civilian culture, pursuing employment and/or education, navigating new and established relationships, and managing complex healthcare needs (6). The concentration of these stressors within a short time has critical impacts on health; in the first three months after discharge, Veterans are two and a half times more likely to die by suicide than active-duty service members (7).

To support Veterans during the transition period, the Department of Veterans Affairs (VA) helps administer the Transition Assistance Program (TAP) to active-duty service members, equipping them with an understanding of how to access the benefits they have earned, including healthcare, education, housing, pension, and disability (8). To qualify for healthcare benefits through the Veterans Health Administration (VHA; the healthcare arm of the VA), Veterans must fall into one of eight priority groups on the basis of military service history, disability rating, income, and receipt of other VA benefits (9). These groups dictate the scope and cost of health services offered (9). Given the complexities of enrollment and access, fewer than half of U.S. Veterans use VHA services, leaving millions to seek support elsewhere or go without care (10). This coverage gap highlights the limits of VHA-centric solutions and calls for a broader system perspective on Veteran wellness.

Health trajectories are shaped not only by access to healthcare but also by social determinants of health (SDOH): the “conditions in which people are born, grow, live, work and age and people’s access to power, money, and resources” (11). These conditions dictate a Veteran’s ability to obtain stable housing, employment, education, healthcare, and social connection. Evidence shows that SDOH have a stronger influence on health than does clinical care (12), making addressing these factors critical for holistic well-being. A 2020 VA workgroup identified understanding the effects of co-occurring SDOH as one of three top priorities, noting that little is known about how these factors influence healthcare utilization and outcomes nor how the VA can bridge those gaps (13). Many VA medical centers now administer screenings to assess unmet needs spanning transportation, utilities, education, employment, legal services, social isolation, and internet access (14). However, a survey of 120 medical center leaders found that half lacked formal partnerships with the community organizations and the resources needed to address these needs (13), limiting screening effectiveness.

The interactions between Veteran well-being and SDOH are multifaceted and dynamic over the life course; a study found that working-age Veterans most commonly needed employment support, food assistance, and community services (e.g. volunteer opportunities and social support), whereas retired Veterans, having served 20 years or more, most frequently needed legal aid and behavioral healthcare (15). A deeper understanding of these interactions is needed to reveal the mechanisms driving Veteran morbidity and mortality—especially for Veterans not eligible for or engaged in VHA care (16). Where current infrastructure and coordination fall short, a systems approach offers the tools for examining and addressing these complex factors.

Systems science is an interdisciplinary field that moves beyond examining isolated components of a system to analyzing their interactions holistically (17). Among many available systems science methods, systems mapping is particularly well-regarded for its ability to support decision-making in health policy, planning, and implementation (18). Causal loop diagrams (CLDs) are qualitative mapping tools that depict relationships between variables in a system and can help illuminate vicious and virtuous cycles that facilitate or hinder change (19). Participatory systems mapping invites stakeholders to share their expertise and lived experience through interactive activities to co-develop CLDs, creating a shared framework for change.

Frameworks such as the Vital Conditions (VC) for Health and Well-Being are used to understand SDOH at a community level (20). This framework calls out seven conditions necessary for wellness—humane housing, belonging and civic muscle, meaningful work and wealth, reliable transportation, basic needs for health and safety, thriving natural world, and lifelong learning—highlighting the interdependence of social needs and calling for multisector action that extends beyond medical settings (21).

This study focuses on basic needs for health and safety, while recognizing the role that other VCs play in shaping Veteran health outcomes. We pose the questions: (1) “What are the greatest barriers to health and safety for Veterans?” and (2) “Given these barriers, what leverage points equip communities to elicit systems change?”. We aimed to build systems-informed tools to help communities understand Veteran needs for health and safety, barriers to change, and opportunities for intervention.

METHODS

Systems thinking tools overview

This study uses evidence-based systems thinking to translate research and lived experience on barriers to Veteran health and safety into accessible tools for community collaboration. It is part of a larger North Carolina (NC) initiative, the Healthy Vets Community (HVC) Project, approved by the Institutional Review Board at UNC Chapel-Hill (#25–0254). The HVC project aims to improve the community conditions affecting Veteran wellness through collaboration, particularly within four hub counties across the state (22). We applied the VC framework, causal loop diagramming, and the iceberg model for systems thinking to understand Veteran wellness holistically; our process is illustrated in Fig. 1.

Figure 1. Process of tool development and validation

Causal loop diagrams

CLDs depict causal interactions between variables within a system as arrows. Arrow polarity indicates the nature of each relationship: blue arrows denote same-direction relationships, in which an increase in one variable corresponds to an increase in the other, while red arrows denote opposite-direction relationships, in which an increase in one variable corresponds to a decrease in the other (Fig. 2). Of particular importance in CLDs are feedback loops: linkages of two or more arrow-variable relationships that are drivers of system behavior (23). Reinforcing feedback loops (labeled ‘R’) perpetuate change in the same direction, whether vicious or virtuous, while balancing feedback loops (labeled ‘B’) resist change, as change in one direction compels a corrective response that pushes the system back to equilibrium (Fig. 2).

Iceberg model and leverage points

The iceberg model for systems thinking links concerning events and trends to the underlying system structures and mental models that drive them (23–26). Each iceberg level was paired with leverage points drawn from the CLD to address those barriers. This tool can complement complex CLD relationships by offering a more accessible entry-point for communities to engage in systems thinking, enabling them to recognize challenges they face, understand their root causes, and engage in sustainable, cross-sector solutions.

Study design and data collection

Literature review and causal loop diagrams

An iterative and collaborative process informed the development of the CLD. A literature review was double-coded in Atlas.ti for: (1) system supports (policies, practices, resources, and services); (2) iceberg elements (mental models and cross-system characteristics); (3) individual and interpersonal risk and protective factors; and (4) pertinent VCs. Within each code, we inductively created and standardized more specific subcodes. For each coded excerpt, we extracted causal linkages between standardized subcodes (e.g. social isolation (opposite relationship, denoted ‘o’) mental health).

We translated these linkages into a prototype CLD using Kumu, a systems mapping platform, in a series of virtual team meetings, discussing hypothesized new linkages which were subsequently validated or invalidated and modified through rapid reviews. These reviews identified 135 unique sources, including peer-reviewed articles, governmental reports, and organizational websites. This iterative extraction process allowed for the synthesis and visualization of a broad evidence base in CLD form. Excerpts substantiating causal linkages were embedded into variables and connections in the Kumu CLD.

Participatory validation through feedback sessions

Initial community feedback session

We held a preliminary two-hour semi-structured feedback session (N = 8) in June 2025 in a Western NC community to refine the CLD prior to developing the iceberg model. During the session, the larger CLD was presented in four smaller “stories” gradually revealed in an interactive Kumu presentation to elicit focused feedback. Discussion was encouraged throughout to foster an open dialogue. Next, leverage points from the CLDs were presented and prompted for additions (e.g. supportive resources that were missing). The session was recorded and transcribed to inform subsequent CLD modifications, including integration of specific quotes and resources.

Iceberg model and leverage point development

Themes from the CLD which captured barriers to change (e.g. problematic mental models) were distilled, organized into iceberg levels, and supplemented and refined through structured team discussions and focus group feedback. Leverage points were drawn from system supports in the codebook: beneficial practices, services, policies, and resources, along with ideal cross-system characteristics and positive mental models. These leverage points were often well-positioned to impact system dynamics in the CLD (e.g. disrupt a feedback loop) and were matched to the iceberg level they were best positioned to address.

Statewide and expert feedback sessions

Both the CLD and iceberg model were refined in a virtual participatory feedback session held in November 2025 with Veterans and community members supporting Veterans (N = 9) across diverse NC counties. Engagement of these actors was crucial to ensuring the usability and relevance of these tools by communities. The gathering was also a valuable opportunity for connection among diverse stakeholders committed to the advancement of Veteran health and safety. The session was facilitated by KHL, an expert specializing in participatory systems mapping and supported by team members with expertise in qualitative coding, systems thinking, and Veteran health. Following a similar format to the first session, we presented four CLD stories via Kumu, with each story followed by guided interactive discussion using sticky notes on Google Slides. During the discussion, participants were asked what resonated with them and what felt confusing, missing, or incorrect. The iceberg model was also validated and refined in an identical manner. Finally, leverage points from the CLD that addressed iceberg barriers were presented, with prompts for any missing supports. The session was recorded and transcribed for incorporation of recommended changes. An optional post-session survey was offered for feedback on the utility of the systems tools for participants in their work supporting Veterans. A full focus group and interview guide, along with handouts given to participants to reference the CLD, iceberg model, and system supports during the session, are included in Appendices B and C respectively.

After revisions to the diagrams were completed based on the statewide conversation, two semi-structured stakeholder interviews were conducted in February 2026 with national experts, individuals with extensive career experience (e.g. research, advocacy) in Veteran health and safety. The interview structure mirrored the format of the statewide session, with a focus on eliciting missing, incorrect, and particularly resonant information.

Participant recruitment and characteristics

Recruitment leveraged existing partnerships with Veteran-serving organizations across four NC hub counties representing both rural and urban areas and diverse organizations, including county health agencies, Veteran Service Organizations, educational institutions, and faith-based organizations. Individuals completed a sign-up form indicating their interest in participating in the systems mapping session and shared the invitation with others they felt would be interested. Former participants were welcomed to subsequent sessions; for instance, community members from the initial CLD-specific feedback session were invited to the statewide session. This snowball recruitment strategy leveraged local networks to convene diverse experiences and perspectives aimed at assessing the system. National experts were identified based on their authorship and/or leadership in organizational efforts related to Veteran health. One academic expert and one medical provider were interviewed. Table 1 summarizes participant roles across feedback sessions.

Table 1
Participant roles by feedback session

Participant role*	No. of participants		
	Community session	Statewide session	Expert interviews
Veteran	3	4	1
Veteran service officer (VSO)	1	3	0
Veteran-specific organization representative	2	1	2
County public health department representative	2	3	0
College/university representative	1	1	0
Healthcare organization representative	0	1	0
Total unique participants	8	9	2
*Participants were counted both as Veterans and in another role, if applicable			

Data analysis

Following each feedback session, transcripts were inductively coded for new CLD variables, new or adapted linkages, and modifications to the iceberg model and its leverage points. Illustrative quotes were incorporated in Kumu map variable descriptions and within the guided presentation. As is common practice

in systems mapping, we edited the final diagrams collaboratively (27).

RESULTS

The final CLD visualizes the interactions and feedback dynamics shaping system behavior, and includes 110 variables, 187 causal links, and 14 feedback loops. Given the complexity of the full CLD, it was organized into four thematic diagrams: (1) Recognizing the health impacts of service; (2) Supporting a successful transition to civilian life; (3) Understanding care-seeking behaviors and barriers to eligibility; and (4) Championing enrollment and utilization of health services (See Appendix A). Within each diagram, the most critical feedback loops were selected based on literature, participant feedback, and research team deliberation (for detailed loop descriptions and supporting excerpts, see Table 2). A publicly available interactive presentation was created to present each sub-diagram gradually (reference in Appendix A's legend). Several strategies enhanced the approachability of diagrams. Variables were annotated with icons characterizing them as system supports, mental models, or cross-system characteristics identified from the initial literature review and subsequent feedback sessions. Further, brief descriptions and supporting evidence were added to all variables and causal linkages, accessible via click and zoom features in the interactive presentation.

Recognizing the health impacts of service

Understanding the military environment, culture, and experience is foundational to appreciating the complexity of Veteran health. Service-connected health ailments often compound with stressors of transition to drive behaviors that result in disqualification from care and social isolation.

Left unmanaged, service-connected conditions can drive anger and irritability, increasing propensity for risky behaviors such as reckless driving, violence, substance use, and suicide (28). These behaviors may result in incarceration, which disqualifies Veterans from receiving VHA care in the hospital or outpatient settings (29), undermining the management of underlying conditions. Deteriorating Veteran health increases the likelihood of risky behavior, closing a feedback loop in which unmanaged conditions and loss of healthcare and benefit eligibility reinforce one other (R1). Veterans discharged with less-than-honorable status (or “bad paper” discharge) represent a small proportion of all Veterans yet bear a disproportionately high burden of unmet healthcare needs due to their ineligibility for most VHA services (30). Notably, their discharge status may reflect the behavioral consequences of untreated service-connected conditions (31).

A strong military identity—cultivated through shared military purpose, camaraderie, and structured routine—can limit the adoption of a civilian identity by heightening a Veteran's perceived differentiation from civilians (32). This divergence attenuates perceived belonging in civilian life, contributing to social isolation, reducing connectedness, and reinforcing a sense of not belonging (R2). Low belonging is a driver of anger and risky behavior, which produces interpersonal conflict that prevents the formation of relationships foundational to social support (33). The resulting deficits in social connectedness further erode perceived belonging (34). Such conflict also reinforces public stereotypes about Veteran behavioral traits, worsening Veteran belonging and increasing the likelihood of risky behavior and interpersonal conflict that exacerbate these biases (R4). Separately, experiencing disability-related difficulty with activities of daily life creates tension with the autonomy and self-sufficiency central to military identity (35). Because greater use of VHA services is associated with a strong military identity (35), lower utilization of care driven by a disrupted military identity compromises health management, increasing difficulty with daily activities (R5). This reinforcing cycle is partially counteracted by a balancing mechanism: as health deteriorates sufficiently, unmet need eventually motivates care-seeking, increasing utilization and health management in ways that stabilize health and reduce ongoing care demands (B1)—but it is not clear if this balancing loop kicks in as soon as it should and addresses health needs to the extent needed.

These vicious reinforcing cycles reveal the dangers associated with service-connected health conditions and disruption of military identity upon transition—especially when Veterans face structural barriers to treatment. However, they also elevate the importance of social support and public education on the military experience as important leverage points to promote understanding and combat stereotypes and stigma. Participation in Veteran networks can provide social support and reinforce military identity, promoting belonging; many such programs also have a therapeutic effect and can treat service-connected health conditions, like hiking groups or horseback riding (32). Similarly, participants noted that new VA policy expands eligibility for mental health services to Veterans with bad paper discharge, increasing access for this vulnerable population. Furthermore, recognizing and addressing threats to mental health that may lead to bad paper discharge during active service are critical to Veterans' lifelong health.

Supporting a successful transition to civilian life

The transition to Veteran status is a delicate window of opportunity for connection with or avoidance of healthcare and broader social services to support health holistically (6, 34). Key to engagement is benefit literacy: a Veteran's understanding of the eligibility requirements and processes governing access to VA benefits. Participants identified the TAP program as the primary means to this literacy. Its brevity, heavy information load, virtual format, and inconsistent implementation, however, limit its effectiveness.

Social support is a facilitator of both benefit literacy and sense of belonging upon transition (36). Beyond family and friends, Veteran outreach services—including VSOs, nonprofits, and independent groups—were consistently described as critical vessels of connection and confidentiality outside formal VA structures, supporting benefit enrollment and conducting outreach to recently-transitioned Veterans. VSOs support connection to local social services and resources including transportation, housing, and food assistance, promoting successful integration and independence in civilian life. Notably, VSOs lamented that recently transitioned Veterans were unaware of VSO services and did not understand their independent position; some Veterans assumed that VSOs are VA employees and directed their frustration with the VA toward them. This blame increased VSO burnout, reducing their capacity and limiting available enrollment support, further eroding benefit literacy (R6). Despite often being motivated by a personal commitment to the Veteran community, VSOs described a plethora of barriers to impact, including high caseloads, low pay, high turnover, and limited support for their own wellness: *“All that stuff you're taking on, and then you got your own skeletons in your closet.”*

Veteran outreach services must also overcome another countervailing force: Veteran resistance to help-seeking. Participants described an internal resolve toward self-sufficiency and perseverance emanating from military culture as a primary driver of care avoidance: *“The culture of the military can be a little harsh, and a lot of soldiers develop the independency...it's embedded in them that they're strong, they can do it on their own.”* Similarly, military stigmatization of mental health and substance use treatment discourages care-seeking: *“As a military person, you're not supposed to need help and you're not supposed to ask for help...somebody's wanting to seek mental health services on base and being discouraged from doing it because if you go seek mental health [care], you won't get promoted.”*

These reinforcing loops reveal the lasting impacts service has on help-seeking and benefit literacy. Several leverage points were proposed to bolster Veteran engagement with care. First, restructuring the TAPS program to better build foundational benefit literacy, including reducing stigma toward seeking mental health services, promoting awareness of and connection to local VSOs after settling in a new place, and encouraging help-seeking upon transition can support connection to resources and benefits. The brevity and high density of information offered in TAPS only emphasizes the importance of preparing outreach personnel like VSOs with local understanding and ability to help Veterans access services, supports, and Veteran connections while adjusting to the new civilian context. Community-based efforts—including financial assistance and material support for newly transitioned Veterans—can also support broader determinants of health during transition.

Participants also consistently advocated for routine inquiry and acknowledgment of Veteran status at social service entry points, and for systematic screening for military history in healthcare settings, as mechanisms to enable tailored and informed referrals and to counteract Veteran sense of disconnection. Screening combats mental model barriers by taking the impetus off the Veteran to seek resources. Furthermore, offering community training to build understanding of Veteran needs and available resources promotes awareness of eligibility, motivates care-seeking, and mitigates stigma: *“You don't need to be a VSO, not at all, but you need to be informed and educated enough to know when there's maybe some red flags out there with the Veteran that you're helping.”*

Understanding care-seeking behaviors and barriers to eligibility

The challenges of transition may compound over time, delaying care-seeking and access for years or even decades. Veterans pursuing care reported that delays may be prolonged by complex enrollment processes and ever-changing eligibility criteria, which complicate benefit literacy, increase hopelessness, and discourage care-seeking.

To enroll in healthcare or disability benefits later in life, Veterans must often undergo compensation and pension (C&P) exams, which are medical evaluations (often conducted by third-party providers) that determine whether a health condition or disability is service-connected. Participants expressed significant concern about exam quality, noting that evaluations are frequently conducted by non-physicians who fail to reference Veteran service records or the VA's “problem list” of service-connected diagnoses. Though examiners undergo training, they are not held to a benchmark for understanding or exam quality: *“They get that training, but as we all know, that that doesn't necessarily mean that you followed it, that you understood it, that you connected as to why it's important.”* Veterans seeking care later in life, often with more complex needs, described encountering examiner biases shaped by limited familiarity with Veteran health, resulting in a negative medical opinion and benefit denial. In practice, the main check on improper denials is a VSO appeal to a VA examination liaison. However, participants reported that with only one such position per branch, that safeguard is largely illusory, limiting accountability for repeated denials. Unresolved denials Veteran reinforce hopelessness and motivate care avoidance.

Word of mouth is a powerful means of communication within Veteran networks—and can spread both positive and negative experiences. Veterans who share their denial experiences may discourage other Veterans from enrolling by leading them to assume their own ineligibility. Changing eligibility criteria make intercepting this dynamic especially important. In a dialogue with a Vietnam Veteran, a participant emphasized the dangers of delays in eligibility expansion: *“What year did you get out of Vietnam? 1969. And what year did the government as a whole admit that Agent Orange was a thing? 1978 or somewhere. So you have at least 10 years of people being told they have nothing.”* Patterns of denial among cohorts of Veterans seeking care for comparable service-related conditions can foster negative word of mouth and deepen institutional distrust, further alienating Veterans from the VA. Should these service-related conditions later gain recognition, the resulting generational mistrust and benefit literacy gaps (i.e., lack of understanding of new policies) pose substantial obstacles to re-engaging affected Veterans. Providers with limited familiarity of eligibility systems may not be aware of changes in criteria, fostering misplaced biases: *“My dad waited years to get treated for his Agent Orange from Vietnam and they finally gave him 50% [service-connected disability] and questioned why he took so long to get treated.”* These prejudices foster mistrust and discourage future utilization, limiting provider engagement with Veteran patients and reinforcing biases (R7). When these biases occur in the C&P exam context, they may increase provider hesitancy to establish service-connection, increasing denials, hopelessness, and care avoidance that further reinforce provider biases regarding Veteran needs (R8).

Frustration and hopelessness with enrollment criteria, processes, and lack of improvement of suffering may cause Veterans to avoid care entirely, worsening health and perpetuating hopelessness in a vicious cycle (R9). At the extreme, poor health can lead to suicide risk. Hopelessness and suicide are two visible and measurable manifestations of structural eligibility barriers that can heighten pressure to re-evaluate denials and to re-engage Veterans who are disengaged because of denials, leading to a decrease in denials as a balancing feedback loop (B2). This balancing loop is not guaranteed to work, nor work fast enough; communities were encouraged to ensure signals of unmet Veteran need are measured, recognized, and acted upon faster—while physical and mental health improvements are still feasible.

Veterans who lack awareness of enrollment supports are at heightened risk of disengaging from the process, a vulnerability that has given rise to both legitimate supplemental navigation assistance Veterans could be made more aware of as well as illegitimate actors seeking to exploit Veterans. VSOs cautioned against fraudulent third-party enrollment services, colloquially referred to as “claim sharks,” which charge exorbitant fees for the claim support services that VSOs provide at no cost to Veterans. Further, claim sharks may involve an attorney, which precludes VSOs from becoming involved and limits support available for the Veteran.

Taken together, these loops demonstrate the cascading consequences of implicit biases, resource constraints, and complex eligibility criteria within established systems for help-seeking and enrollment. A frequently shared leverage point in communities were advocates, or “battle buddies” who can serve as stabilizing forces, reducing hopelessness following denials and reinforcing persistence while Veterans work through appeals to interrupt the cycle of disengagement. One participant described this support: *“I would say what helped me the best was...my Veteran Service Officer from the VFW, and just as much as she was an expert at being a Veteran Service Officer, she was just as much a coach. When I would have a setback, that was my coach...Veterans need a coach, they need a connection.”* Also, introducing quality controls to C&P examiner training and day-to-day role execution, as well as responsive points of contact at the VA who oversee examiners, could support exam quality and minimize repeated denials and disengagement—and the downstream consequences of worsened health.

Championing enrollment and utilization of health services

Ideally, Veterans using VHA services would have positive experiences in VHA facilities, which encourages their and other Veterans’ use of VHA care. This, in turn, strengthens system capacity through federal funding tied to utilization rates, which improves quality and accessibility of care and addresses the health issues that brought Veterans to care. In a perfect world, this process would right-size VHA funding to align with care needs through balancing loop B3. One place this loop can fail, however, is that Veterans reported avoiding using VHA care out of a belief that others needed or deserved services more: *“For years, I didn’t use the VA because I felt like I can work or use organizational insurance. I don’t want to take that from someone who perhaps doesn’t have these other options.”* However, because annual Congressional appropriations are adjusted based on forecasted enrollment and utilization (37), Veterans who self-limit utilization can worsen care access and quality for other Veterans.

Additionally, navigating VHA and non-VHA healthcare settings presents an additional layer of intricacy to healthcare access. VHA hospitals have largely remained in place even as the Veteran population has transitioned into the southern U.S. over the past half-century, straining some facilities while leaving others underused (38). Aiming to meet Veteran demand more quickly and expand its geographical reach, the VHA has pushed to expand care into non-VHA settings by acting as an insurer of private care (38). While market competition theoretically drives down prices in private care, this has not been the case: The Office of the Inspector General found that 38% of the VHA’s private partners engaged in fraudulent billing practices that resulted in overcharging (39). Combined with surging demand and the VHA’s limited ability to regulate private service utilization, these inflated costs have placed mounting pressure on the overall system (40). Privatization is now the single largest driver of VHA expenditures, which grew by 50% from 2021 to 2025 (41).

The rapid rise in expenditures fuels perceptions of wasteful spending, which can prompt cost-avoidant mindsets and a desire to decrease service use by downsizing internal capacity and redirecting Veterans toward non-VHA settings. This is a fixes-that-fail systems archetype: downsizing targets the symptom (spending) without addressing its cause (non-VHA care-seeking) and actively worsens it (42). The consequences of reduced internal capacity are felt at the point of care. Veterans described difficulty obtaining referrals and authorization by VHA primary care providers, who were already stretched thin: *“If you’ve got people coming through on a 15-minute rotation and they’re complicated, that referral is hard to churn out.”* Capacity constraints degrade patient experiences and drive them into non-VHA settings—eroding the pathway to lower-cost care, increasing pressure to downsize, and making the VHA system less fiscally sustainable over time (R10).

Frustrating patient experiences in the VHA can drive mistrust. Participants described a perception of provider reluctance to make diagnoses that would trigger expensive or long-term treatment: *“To me, it seems like we are constantly fighting that we have to get the [organization] who’s going to have to write the check to agree that there’s an issue.”* Regardless of whether provider behavior is explicitly cost-driven, the perception of diagnostic reluctance among Veterans erodes trust in the VHA. Importantly, if cost avoidance distorts diagnostic practice, lack of appropriate treatment can worsen health and increase acuity and costs, reinforcing cost avoidance in a vicious cycle (R11).

These feedback loops help contextualize possible cost drivers behind VA policy change and shifting Veteran experiences with care. Although we uncovered implications relevant to the VHA, communities are well-positioned to disrupt and mitigate some of the dynamics described above. For instance, the shift to non-VHA care enables care to be more community-appropriate (e.g. a community with a large Hispanic population may offer more culturally competent care); however, community providers may not know how to support Veterans specifically: *“Whether those are physicians or nurses who are coming in and training and understanding the importance of Veteran health... We’re not providing that kind of information to our potential workforce right now...that’s a gap because so many people are not in the VA and they are in [non-VHA care] spaces and they’re not getting [Veteran-specific] care.”* From the Veteran perspective, privatization can be disorienting and confusing, underscoring the importance of benefit literacy and clear communication of the care-seeking process. Reframing VHA utilization as a collective benefit—one that supports fellow Veterans—can help correct sacrificial mindsets and encourage engagement. Finally, from the system perspective, participants advocated that the federal government account for the high cost of Veteran needs before active-duty members return from service to prepare the system for the cost burden, rather than falling into vicious cycles of unmanaged needs, limited resources, and cost avoidance.

[Insert Table 2]

Iceberg model barriers and leverage points for change

The iceberg model synthesizes and organizes challenges that inhibit Veteran health and safety, from surface-level outcomes to deeper drivers of system behavior, according to their relative difficulty to change and potential for impact. The final iceberg includes 11 events, 11 trends, 15 system structures, and 15 mental models that act as barriers to system-wide change (see full lists in Table 3). Events, surface-level outcomes that are warning signs of problematic underlying behavior, included unmanaged Veteran health, suicidal ideation and attempts, and benefit denials. Trends—events that form patterns over time—included persistently low benefit literacy, rising medical mistrust, increasing utilization of non-VHA services, and diminishing provider availability within the VHA. System structures such as inadequate transition support from active duty to Veteran status, complex and variable eligibility criteria, and third-party contracting for C&P exams identified the architectural weaknesses undermining healthcare access. These structures are shaped by mental models:

individual and organizational values and beliefs that govern investment decisions and policy design. Mental models included military culture's stigma against help-seeking, provider implicit biases towards Veterans, the Veteran belief they are undeserving of care, and a limited cross-sectoral collective commitment to reducing Veteran suicide.

Solutions that address deeper levels of the iceberg are more effective at achieving lasting systemic change. 93 leverage points—including supportive resources, services, policies, practices, mental models, and cross-system characteristics drawn from literature and focus groups—were matched to each iceberg level. Leverage points at the event and trend levels, including food vouchers and mental health services, best addressed downstream system outcomes. Deeper leverage points, like policies expanding VA eligibility and supporting the VSO workforce, were better positioned to address deeply rooted iceberg barriers, yet required more substantial political and financial capital.

[Insert Table 3]

DISCUSSION

Barriers to Veteran health are well-documented, yet the dynamic interrelationships among those barriers—and the structures that sustain them—remain poorly understood. By translating evidence from the literature and from Veterans, communities, and experts into a CLD and an iceberg model, this study produces practical systems tools designed to support community-level assessment, awareness, and action around Veteran health and safety.

Alignment with existing literature

Our findings align with prior qualitative research identifying barriers to Veteran health, including the complexity of benefit systems, administrative hurdles and delays, lack of coordination across VA and community care, and limited Veteran cultural competency and resource awareness within communities (43–45). This study extends that literature in two ways. First, rather than treating these barriers as independent, the CLD situates them within a system of interconnected feedback dynamics, illustrating how barriers compound one another and prevent sustained change. Second, while system dynamics methods have been widely applied to a variety of complex public health and social challenges, only one prior study used CLD to examine Veteran healthcare access, and that study focused on rural Veterans (46). Our work expands this scope by examining Veteran health across the life course (starting from transition to Veteran status). Also, by pairing CLDs with an iceberg model, we synthesize and organize root causes, system challenges, and connected opportunities for action across iceberg levels.

Though not an initial aim of this work, the rapidly shifting federal political landscape—including funding freezes, VA workforce reductions and administrative restructuring, and major shifts in VHA healthcare service delivery—emerged recurrently across focus groups and expert interviews. Accordingly, this study supplements existing qualitative literature by illuminating barriers arising from these recent developments. As one participant noted, the stakes of this context are high: *“You don’t want to do all of this work and get here and those solutions be ineffective or impractical because of the changes in the policy stuff that’s happened along the way.”*

Key insights

First, there are leverage points that need to be worked on at the VA system level as well as community level (e.g. community-based providers) and interpersonal level (e.g. battle buddy supports after denials). Several feedback loops reflected systemic barriers, like eligibility criteria, resource limitations, and cost constraints, that lie deep within the iceberg model and are difficult to shift. However, many loops also center on interpersonal leverage points: outreach, advocacy, and education around Veteran experiences, needs, and available resources. These findings suggest that responsibility for Veteran well-being is not limited to the VA or policymakers; faith-based leaders, employers, and other community actors are well-positioned to interrupt cycles of social isolation, poor benefit literacy, and care avoidance.

Second, systems tools are useful for expanding stakeholder understanding of complex Veteran health dynamics. Focus group discussions were consistently rich; presented diagrams spurred conversation about what resonated and local examples of challenges that could be addressed were shared. Post-session survey responses indicated that participants found tools *“easy to follow”* and that *“discussions were amazing.”* The iceberg model was identified as *“a great summary and would be useful to share in the community.”* These responses suggest that the CLD and the iceberg model can meaningfully inform non-traditional actors on barriers to Veteran wellness, even without prior familiarity with systems thinking.

Third, systems tools prompt action. Feedback session discussions of barriers to health served as a natural stimulus for collaborative ideation; the post-survey revealed a range of creative actions participants identified they could take—from increasing resource awareness to addressing social isolation among elderly Veterans. Drawing on this momentum, the interactive presentation includes targeted prompts encouraging viewers to identify local barriers and concrete action opportunities. The iceberg model and its corresponding leverage points are foundational tools to support and guide these local solutions.

Strengths and limitations

This study has several strengths. It combines proven system dynamics methods—CLD and the iceberg model—with the VC framework to center whole health over the mere absence of disease (47). It also takes up the call for innovative forms of applied systems thinking in public health. Materials were iteratively refined through participatory engagement and are publicly available via Kumu (48). Drafting CLDs from the literature prior to stakeholder engagement (rather than co-creating them in real time) allowed diagrams to be grounded in evidence before validation, which may have pushed for broader discussion beyond what could have been raised had we started from a blank canvas. While participants reacted to the diagram with variables that were missing, this approach may have content that participants would have otherwise raise on their own.

Although the project's foundation was a national literature review and synthesis, stakeholder engagement was conducted exclusively in NC, possibly limiting generalizability. We attempted to counteract this concern by validating CLDs with national experts. Virtual feedback sessions, while necessary to broaden participation geographically, may also have limited depth of discussion relative to in-person sessions. Our snowball sampling recruitment method may have constrained the diversity of perspectives represented. Finally, creating CLDs on Kumu requires expertise and can be time-consuming. Kumu presentations also require internet access, which may limit use in some community meetings.

Future directions

Future work should explore best practices for engaging communities, including non-traditional actors, around systems influencing Veteran health. The interactive presentation is a starting point for community discussion but relies on willingness of actors to engage with systems thinking and the technological capabilities to view and navigate the presentation. Sharing successful facilitation strategies and applications of the tools locally, as well as challenges encountered during use, will be essential for strengthening these tools over time. Though our literature review synthesized a wide breadth of evidence, it was not exhaustive and systems will continue to evolve. We hope this work will be a launching point for future reviews, community discussions, and initiatives striving to strengthen Veteran health in communities across the US.

CONCLUSIONS

This study addresses the need for collaborative, community-based approaches to advancing Veteran health and safety. By integrating evidence from the literature with Veteran, community, and expert perspectives, we developed systems tools, including a causal loop diagram and iceberg model, that make visible the interconnected dynamics sustaining poor health outcomes from the transition to Veteran status throughout the life course. These tools position community actors, policymakers, and institutions alike to identify local leverage points for change. This work is a foundation for prioritization of action and system-strengthening in support of Veteran wellness.

Abbreviations

CLD
Causal loop diagram
C&P Exam
Compensation & Pension Exam
NC
North Carolina
SDOH
Social Determinants of Health
TAP
Transition Assistance Program
VA
Department of Veterans Affairs
VC
Vital Conditions
VHA
Veterans Health Administration
VSO
Veteran Service Officer

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the guidelines established by the University of North Carolina at Chapel Hill's Office of Human Research Ethics Institutional Review Board (IRB Study #25-0254). All focus group participants and interviewees were informed of the study's purpose prior to recruitment and advised that participation was voluntary. Participants provided informed consent for the audio recording and transcription of all sessions. To protect participant confidentiality, all identifying information was removed and quotes were anonymized prior to reporting.

Consent for publication

Not applicable

Availability of data and materials

The qualitative transcripts analyzed in this study are not publicly available, as they contain sensitive information including participant names, county of residence, and age. De-identified participant quotes and references to supporting literature are available in a web-based, interactive version of the study at <https://mguta.kumu.io/health-and-safety-systems-tools>.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

MG led qualitative coding and causal loop diagramming, assisted with focus group facilitation, conducted both expert interviews, analyzed all transcripts, and led manuscript drafting. KHL supported focus group facilitation, diagram revision, and manuscript editing. All authors read and approved the final manuscript.

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Tables

Tables 2 and 3 are available in the Supplementary Files section.

Figures

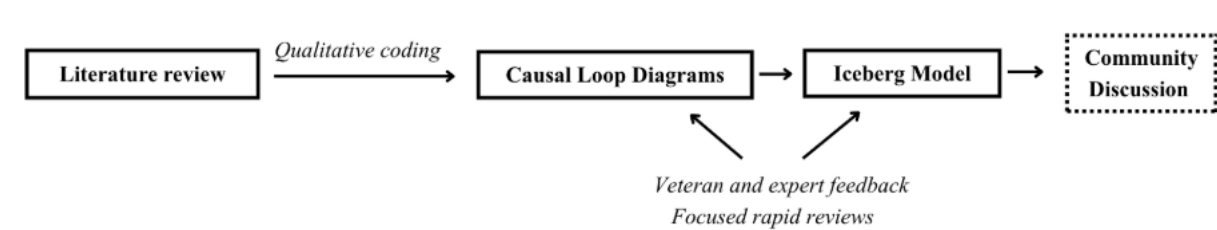


Figure 1
Process of tool development and validation

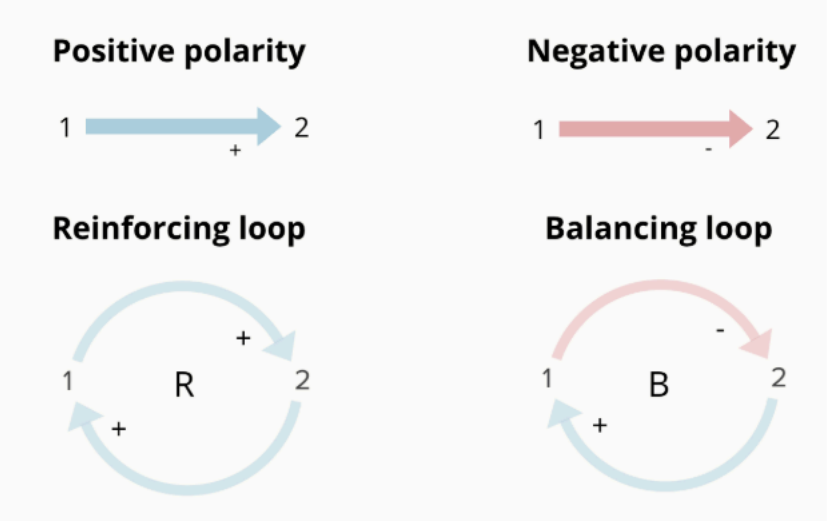


Figure 2

Supplementary Files

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