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Aligning Advanced Public Health Nursing Strategies with Population Vulnerabilities: A Needs-Based Framework for Equity-Oriented Primary Care

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ABSTRACT: Health inequities in primary and community care stem from multidimensional vulnerabilities combining chronic clinical conditions, behavioral health needs, and social and structural risks. Advanced Public Health Nursing (APHN) is central to addressing these inequities, yet clear guidance for aligning APHN strategies with diverse population needs remains scarce. This study aimed to develop a needs-based framework linking vulnerable population profiles with bundled APHN strategies and realistic outcome measures to support equity-oriented practice and evaluation. Using a qualitative, conceptual framework development design based on secondary synthesis of literature from public health, nursing, health services research, and implementation science, the study analyzed conceptually rich sources to identify vulnerability patterns, APHN strategy domains, and feasible proxy outcomes. An iterative analytic process aligned population profiles with multicomponent strategy packages, supported by theoretical anchoring, transparent procedures, and an audit trail. Findings showed that populations such as low-income groups with comorbidities, homeless individuals, migrants, frail older adults, and maternal–child dyads face overlapping clinical and social vulnerabilities that isolated interventions cannot adequately address. Bundled strategies—outreach, case management, culturally safe communication, intersectoral coordination, and system navigation—proved more relevant. Traditional clinical outcomes alone were deemed insufficient; proxy outcomes on access, engagement, continuity, utilization, and experience are essential. The resulting framework supports coherent practice planning, workforce role delineation, and policy-relevant evaluation, with future research needed to empirically test and refine it across contexts.

Keywords: Advanced Public Health Nursing, Health Equity, Vulnerable Populations, Primary Care, Conceptual Framework, Proxy Outcomes.

INTRODUCTION

Health inequities persist as a defining challenge for primary and community health systems worldwide, reflecting patterned and avoidable differences in health outcomes across

socioeconomic, demographic, and geographic groups. A converging body of evidence demonstrates that these inequities are driven less by deficiencies in biomedical care per se than by the social, economic, and structural conditions in which people are born, grow, live, work, and age. Determinants such as income insecurity, housing instability, food access, transportation, environmental exposure, and social exclusion exert a powerful influence on health trajectories, often outweighing the predictive contribution of medical services alone (Lew & Sommers, 2022; Reising et al., 2022). Consequently, inequities in primary and community care must be understood as outcomes of "upstream" determinants embedded within broader social and policy contexts rather than as isolated failures of individual behavior or clinical decision-making.

Within this perspective, economic precarity and material access barriers emerge as recurrent mechanisms through which inequities are reproduced. The literature consistently identifies poverty, unstable employment, transportation constraints, and inequitable distribution of preventive and first-contact services as core drivers of delayed care, fragmented continuity, and poorer outcomes in underserved populations (DeHaven et al., 2020; Serafica et al., 2024). These challenges are magnified in rural and otherwise underserved settings, where shortages of health professionals particularly in mental health and chronic disease management constitute a direct structural determinant of inequitable access to primary care (Kessinger et al., 2022; Poghosyan & Carthon, 2017). Residency in Health Professional Shortage Areas (HPSAs) has been repeatedly associated with unmet need and worse outcomes, while simultaneously revealing both opportunities and constraints for expanding community-based capacity through alternative workforce models (Kessinger et al., 2022; Tapp et al., 2024).

Beyond material deprivation, inequities are sustained through institutional and structural arrangements that systematically disadvantage certain groups. Health inequity is commonly defined as the presence of avoidable and unjust differences between population groups or geographic areas, underpinned by organizational, structural, and clinical barriers that limit access to timely, appropriate, and high-quality care (Jacko & Sainfort, 2023). These barriers are increasingly situated within historical and contemporary relations of power, including systemic racism and other forms of structural discrimination, which have shaped health systems and clinical norms in ways that marginalize racialized communities and other historically excluded groups (Adeniran, 2023; Eden et al., 2022). Such forces influence not only service utilization but also patient experiences, trust in health institutions, and downstream outcomes (Baker et al., 2021; Eden et al., 2022).

For specific populations, inequity manifests in particularly acute and tangible forms. Studies focusing on transgender and non-binary populations, for example, document persistent experiences of service denial, harassment, and insufficient clinical knowledge, constituting both a structural barrier and a failure of system capacity to deliver competent and safe care (Morenz et al., 2020; Selix & Rowniak, 2016). Qualitative syntheses across marginalized populations similarly underscore that inequity is enacted through stigmatization, lack of person-centredness, and poor cultural and relational fit between services and communities, reinforcing the understanding that inequities arise from deficits in accessibility, acceptability, and appropriateness rather than from individual-level nonadherence or preferences alone (Baker et al., 2021; Morenz et al., 2020).

In response to these challenges, population health, health equity, and primary health care frameworks have increasingly converged around the need for integrated, context-sensitive approaches. Population health in primary care is articulated as an orientation that seeks to improve outcomes at the level of defined populations through first-contact services, yet its operationalization requires organizational redesign and clearer translation into practice (Haggstrom et al., 2024). Health equity is framed as the absence of avoidable differences between groups, explicitly foregrounding the role of organizational and structural barriers in shaping access and outcomes (Jacko & Sainfort, 2023). Primary health care, in turn, is characterized as a whole-of-society approach centred on the needs and preferences of individuals, families, and communities, integrating physical, mental, and social dimensions of health and addressing broader determinants beyond clinical care (Shi et al., 2021). Collectively, these frameworks position advanced nursing practice as a potential nexus connecting longitudinal clinical care, action on social determinants, and system-level equity strategies.

However, within the reviewed literature, the role of Advanced Public Health Nursing (APHN) is more often operationalized through related constructs such as nurse practitioners, family nurse practitioners, nurse-led clinics, and integrated primary care models than through a single, unified definition of APHN itself (Tapp et al., 2024; Tobbell, 2024). Drawing from this evidence, a defensible conceptualization of APHN aligned with population health and equity frameworks is that of advanced nursing practice oriented toward populations, combining expanded clinical competencies with community intervention, intersectoral integration, and system redesign to reduce inequities (Poghosyan & Carthon, 2017; Tobbell, 2024). Historical accounts of nurse-led community clinics dating back to the 1960s illustrate this intersection of clinical care and community mission, demonstrating cost-effective primary care delivery in underserved communities (Tobbell, 2024; Tapp et al., 2024).

Contemporary literature further emphasizes the underutilized potential of advanced nursing roles to mitigate disparities through expanded access in primary care, particularly for racialized and socioeconomically marginalized populations, while acknowledging persistent regulatory and organizational barriers that constrain optimal deployment (Poghosyan & Carthon, 2017; Tapp et al., 2024). Parallel efforts to diversify the advanced nursing workforce through educational and institutional partnerships are also framed as equity strategies, addressing structural imbalances in workforce availability and representativeness (Agic et al., 2022; Johnson et al., 2023). These developments signal an evolution of APHN roles beyond direct clinical provision toward broader engagement with equity-oriented system transformation.

Evidence also highlights the limitations of uniform, "one-size-fits-all" interventions when applied to heterogeneous vulnerable populations. In the domain of virtual and digital care, rapid implementation has been shown to risk widening disparities, as underserved communities are less likely to benefit without deliberate equity-focused design and support (Chaudhuri, 2022; Fujioka et al., 2020). Empirical studies in underserved regions demonstrate both opportunities and constraints of digital tools, underscoring that effectiveness cannot be assumed to generalize across contexts (Blount et al., 2023). Similar patterns are observed in public health responses to outbreaks and disasters, where systematic reviews caution that universal measures do not automatically

reduce inequities without explicit adaptation and attention to structural drivers (Williams et al., 2021; Lew & Sommers, 2022).

The insufficiency of uniform approaches is further evident in areas such as chronic pain management in underserved older adults and culturally competent care for LGBTQIA+ populations, where evidence-based interventions often fail to reach the settings and groups most in need or require substantial contextual adaptation to be effective (Cassidy et al., 2023; Rush et al., 2024). Across these domains, the literature converges on the conclusion that without vulnerability-focused targeting, cultural and contextual adaptation, and explicit attention to structural barriers, standardized interventions are unlikely to achieve equitable impact (Williams et al., 2021).

Despite recognition of the need for complexity-sensitive approaches, significant gaps remain in the integration or bundling of APHN strategies. Existing studies frequently examine isolated components such as navigation, access expansion, behavioral health integration, or digital tools without systematically combining strategies across clinical, community, and system levels (Hoeve et al., 2022; Teggart et al., 2023). Reviews of navigation programs explicitly note that their effectiveness remains largely uncertain, reflecting limited clarity regarding essential components, optimal combinations, and contextual conditions for success (Teggart et al., 2023). Similarly, population health initiatives in primary care are often described as requiring "further consideration," suggesting an absence of fully specified and evaluated integrated models in real-world practice (Haggstrom et al., 2024).

A related gap concerns measurement. Traditional clinical outcomes and biomarker-based indicators are poorly suited to capturing the impact of population-based nursing interventions, which aim to influence access, continuity, coordination, acceptability, and social conditions rather than short-term individual clinical change (Lew & Sommers, 2022; Haggstrom et al., 2024). Performance measurement systems may inadequately represent marginalized populations or obscure inequities, as evidenced by critiques of standardized incentive and quality frameworks (Eggleton et al., 2017). In response, scholars argue for multidimensional metrics incorporating equity, experience, utilization, and contextual data, including the integration of community-level information with electronic health records to guide equitable decision-making (Angier et al., 2018; Pressman et al., 2019).

Against this backdrop, the present study seeks to address a critical gap by proposing a needs-based framework for aligning Advanced Public Health Nursing strategies with the dominant vulnerabilities of diverse population groups. By synthesizing population profiles, bundled APHN strategies, and realistic proxy outcomes, the study aims to advance a practical and evaluable approach to equity-oriented APHN practice. The framework is intended to support more precise intervention design, strengthen accountability for equity, and provide a foundation for future empirical testing across varied primary and community care contexts.

METHOD

This study adopts a qualitative, conceptual framework development design grounded in secondary synthesis of the health services, public health, and nursing literature. The methodological choice reflects the nature of the research problem: the absence of an integrated, needs-based framework to align Advanced Public Health Nursing (APHN) strategies with heterogeneous vulnerable population profiles. When phenomena are complex, multi-level, and context dependent as is the case with equity-oriented primary and community care primary empirical studies often provide fragmented or partial insights that are insufficient to support explanatory integration or practical design. Under such conditions, conceptual framework development through qualitative and interpretive synthesis is an established and appropriate methodological approach in both public health and nursing research.

Study Design and Rationale

Conceptual framework development in health services research commonly relies on secondary synthesis methods that move beyond aggregation of findings to generate explanatory models. Interpretive and theory-informed syntheses are particularly valuable when the available empirical evidence lacks sufficient breadth or depth to explain observed patterns or to guide intervention design. For example, interpretive synthesis has been used to integrate determinants of vaccination coverage and to propose conceptual models precisely because the primary literature was fragmented and insufficient for causal explanation (Phillips et al., 2017). Similarly, framework synthesis approaches are employed to construct multidimensional models anchored in existing theory, allowing researchers to systematize diverse forms of evidence into coherent conceptual structures.

Within public health and primary care research, the use of "best fit" framework synthesis has expanded as a strategy for developing new conceptual models when existing frameworks are poorly aligned with specific contexts. A notable example is the development of a new conceptual model for chronic disease integration in primary care in sub-Saharan Africa, where prevailing chronic care models were not designed for local realities and therefore required adaptation and extension (Jordan & Harrison, 2021). This logic of contextual misfit is directly applicable to APHN practice, where strategies documented in the literature are often developed in isolation or within narrow settings, limiting their transferability across diverse vulnerable populations.

Hybrid methodological designs further support framework construction for complex problems. Studies addressing high-need, high-cost patient management have deliberately combined best fit framework synthesis, realist review, and systematic review to articulate relationships across clinical, organizational, and system levels (Berkman et al., 2021). Such designs underscore the legitimacy of secondary, qualitative framework development as a means of integrating heterogeneous evidence to address questions of what works, how, for whom, and under what conditions. In parallel, critical interpretive synthesis (CIS) has been widely used in health policy and implementation science to reconceptualize constructs and refine relationships among theories when the objective is not merely summarization but conceptual advancement (Duan et al., 2022; McIsaac et al., 2018).

Taken together, these methodological traditions justify the present study's design. The objective is not to estimate effect sizes or test causal hypotheses, but to develop a coherent, theoretically informed framework capable of guiding APHN practice and evaluation in equity-oriented primary and community care settings.

Data Sources and Corpus Development

The analytic corpus consisted of peer-reviewed literature drawn from public health, primary care, nursing, health services research, and implementation science. Sources included systematic reviews, interpretive syntheses, realist reviews, scoping reviews, and applied empirical studies with explicit conceptual or programmatic implications for vulnerable populations and advanced nursing practice. The emphasis was placed on literature addressing: (i) vulnerable population typologies and dominant vulnerabilities; (ii) APHN or closely related advanced nursing strategies (e.g., nurse practitioner–led care, nurse-led clinics, community-based and intersectoral interventions); and (iii) outcome domains relevant to population-based and equity-oriented practice.

This approach aligns with established practices in framework synthesis and conceptual model development, where the goal is not exhaustive enumeration of all studies, but purposive inclusion of conceptually rich sources that inform domains, relationships, and mechanisms (Hekmat et al., 2020; Tremblay et al., 2017). In this sense, the corpus was constructed to support explanatory integration rather than statistical representativeness.

Analytic Procedure

The analytic process followed three sequential and iterative stages.

First, vulnerable population groups were identified and characterized according to their dominant vulnerabilities. Drawing on the synthesized literature, vulnerabilities were conceptualized broadly to include social, economic, structural, legal, and clinical dimensions. This step reflects practices in population health and equity research that prioritize the identification of patterned disadvantage rather than individual risk factors alone.

Second, APHN strategies documented in the literature were organized and bundled in relation to these dominant vulnerabilities. Rather than treating strategies as isolated interventions, the analysis deliberately focused on combinations of practices operating across clinical, community, and system levels. This decision responds directly to identified gaps in the literature, where fragmentation of strategies and uncertainty regarding effective combinations are recurrent limitations (Hoeve et al., 2022; Teggart et al., 2023). Strategy bundling was informed by theoretical coherence, functional complementarity, and plausibility of implementation within primary and community care contexts.

Third, proxy outcome measures were identified and aligned with each strategy bundle. Consistent with critiques of traditional clinical metrics, outcome selection emphasized access, continuity, coordination, engagement, and equity-relevant indicators rather than short-term biomedical change alone. This step reflects methodological guidance from population health and equity

scholarship, which argues for multidimensional measurement frameworks capable of capturing system-level and relational effects of interventions (Angier et al., 2018; Pressman et al., 2019).

Throughout these stages, the analysis remained iterative, allowing insights from later stages (e.g., outcome feasibility) to refine earlier classifications (e.g., strategy bundling). This reflexive process is consistent with interpretive and realist-informed synthesis approaches, where theory and evidence are continually interrogated against one another (Cornes et al., 2017).

Rigor, Transparency, and Trustworthiness

Given the non-empirical and conceptual nature of the study, rigor was addressed through strategies appropriate to qualitative synthesis and framework development rather than through statistical validation. A central mechanism for ensuring transparency and credibility was the maintenance of an explicit audit trail documenting analytic decisions, including literature inclusion criteria, domain definitions, strategy grouping rationales, and outcome alignment choices. The audit trail enables external scrutiny of the reasoning process and supports assessments of dependability and transferability (Carcary, 2021).

Methodological transparency was further supported by explicit specification of the synthesis approaches informing the study. The framework draws on principles from interpretive synthesis, best fit framework synthesis, and realist-oriented analysis, each contributing distinct strengths: interpretive integration of concepts, contextual adaptation of existing models, and attention to mechanisms and plausibility, respectively (Jordan & Harrison, 2021; Cornes et al., 2017). Anchoring the framework in established theories and prior models rather than constructing an ad hoc schema served as an additional safeguard against conceptual arbitrariness (Tremblay et al., 2017; McIsaac et al., 2018).

Triangulation across methodological traditions also enhanced robustness. Insights from scoping reviews and meta-syntheses were used to identify domains and dimensions, while realist-informed reasoning was applied to assess coherence between vulnerabilities, strategies, and outcomes. Such multimethod synthesis has been recommended for complex health service problems precisely because it strengthens explanatory depth and contextual sensitivity (Berkman et al., 2021; Hekmat et al., 2020).

Ethical and Epistemological Considerations

Although the study did not involve human participants or primary data collection, ethical considerations remain relevant at the epistemological level. The framework development process was guided by an explicit equity orientation, seeking to avoid deficit-based or individualizing interpretations of vulnerability. Instead, vulnerabilities were conceptualized as products of structural and systemic conditions, consistent with contemporary equity scholarship. Reflexivity regarding assumptions embedded in the literature and in dominant health system models was therefore an integral component of the analytic process.

RESULT AND DISCUSSION

This chapter presents the results of the qualitative framework synthesis, structured around three analytic components: (A) vulnerable population profiles and dominant vulnerabilities, (B) aligned Advanced Public Health Nursing (APHN) strategy packages, and (C) proxy outcome measures suitable for evaluating equity-oriented, population-based nursing interventions. The results are presented descriptively, focusing on patterns, alignments, and gaps emerging from the synthesized literature, without interpretive expansion beyond the evidence base.

Vulnerable Population Profiles and Dominant Vulnerabilities

Low socioeconomic status populations with chronic comorbidities

Across the synthesized evidence, low socioeconomic status (SES) vulnerability is characterized by a syndemic configuration in which chronic physical conditions co-occur with behavioral health burden and social risk exposure. Community-based scholarship on vulnerable communities in the United States highlights that preventable disease burdens and persistent disparities are disproportionately concentrated in low-income and minoritized populations, shaped by unequal access to primary care and the absence of universal prevention-oriented health system infrastructures (DeHaven et al., 2020). Policy-oriented syntheses reinforce this framing by positioning social determinants such as income, housing, food security, transportation, education, and environmental conditions as dominant drivers of health outcome variation, indicating that chronic illness patterns among low-SES populations are structurally produced rather than attributable to individual behaviors alone (Lew & Sommers, 2022; Reising et al., 2022).

Health services research on high-need, high-cost (HNHC) adults provides a closely aligned empirical profile, frequently overlapping with low-SES contexts. Syntheses identify recurring attributes including multiple chronic conditions, depression and other mental health conditions, substance use disorders, and social risks such as homelessness and poverty, with race also emerging as an important predictor in population identification (Berkman et al., 2021). This evidence underscores that complexity in low-SES populations is inherently multi-domain, requiring integrated responses that extend beyond disease-specific management. Qualitative implementation studies further demonstrate that even when evidence-based nonpharmacologic interventions exist, such as mind–body approaches for chronic pain, they are often not implemented in underserved community clinics due to staffing, scheduling, and participation constraints, indicating that vulnerability is mediated by service capacity and feasibility as much as by clinical need (Rush et al., 2024; DeHaven et al., 2020).

Homeless individuals and families

Homelessness is consistently associated with high clinical complexity, unstable care transitions, and elevated risk of avoidable utilization. A realist synthesis examining hospital discharge for people experiencing homelessness describes a pattern of "tri-morbidity," defined by the co-occurrence of physical illness, mental ill-health, and drug or alcohol misuse, alongside systemic

failures in discharge planning and continuity of care (Cornes et al., 2017). These dynamics contribute to high readmission risk and recurrent crisis utilization, positioning homelessness as both a condition of medical complexity and a manifestation of system-level breakdown at transition points.

From a performance and equity analytics perspective, vulnerable populations' reliance on episodic emergency care rather than continuous primary care is associated with poorer preventive outcomes and motivates the use of ambulatory-care-sensitive utilization metrics to detect inequities (Pressman et al., 2019). Homelessness is explicitly identified as a social risk factor within HNHC profiles, reinforcing the overlap between housing instability, multimorbidity, and fragmented care (Berkman et al., 2021). Qualitative syntheses of marginalized populations' experiences further indicate that discrimination, lack of validation, and complex navigation demands act as cross-cutting barriers to engagement with community-based services (Baker et al., 2021). Collectively, the evidence characterizes homeless individuals and families as facing overlapping clinical, psychosocial, and structural vulnerabilities that push care toward crisis-driven utilization patterns.

Migrant and undocumented populations

Migrant and undocumented populations experience layered barriers to care spanning legal entitlement, affordability, information, language, and fear of repercussions. Qualitative studies of undocumented migrant women in England report that entitlement restrictions and charging practices deter access to maternity services, resulting in delayed initiation of care and less than recommended service use (Feldman, 2020; Nellums et al., 2021). Comparative policy analyses across Europe further demonstrate that access to health care varies substantially by legal status, underscoring that inequities are structurally produced by differential entitlement regimes rather than solely by individual-level barriers (Pařízková et al., 2023).

In geographically constrained and lower-resource settings, such as border regions, undocumented women report extreme access challenges, including giving birth en route to health facilities, reflecting the compounded effects of legal exclusion and physical inaccessibility (Tschirhart et al., 2023). Health system analyses examining efforts to include undocumented migrants in universal coverage frameworks emphasize persistent service provision challenges and the need for policy designs responsive to migrant realities (Tschirhart et al., 2021). Communication barriers and discrimination also recur as central obstacles: syntheses of migrant children's mental health access identify stigma, mistrust, lack of information, and limited cultural responsiveness as demand- and supply-side barriers, while maternity care studies document the necessity of professional interpreter services to ensure safe and equitable care when language discordance exists (Dawe et al., 2023; Place et al., 2021).

Frail older adults with multimorbidity

Direct evidence explicitly operationalizing frailty and functional decline in underserved primary and community care contexts is limited within the included corpus, constituting an identified

evidence gap. Proxy insights are drawn from studies of underserved older adults with chronic pain, where implementation challenges including participation barriers and the need for tailored delivery models reflect functional and engagement constraints without explicitly defining frailty trajectories (Rush et al., 2024). Broader HNHC syntheses emphasize chronic conditions, behavioral health comorbidities, and the necessity of individualized tailoring and trust-building as mechanisms of effective intervention, principles that are likely applicable to frail older adults but remain under-specified as gerontological care pathways in the included literature (Berkman et al., 2021).

APHN Strategy Packages

Nurse-led case management and care coordination

Evidence supporting nurse-led coordination is most clearly articulated in nurse-managed primary care settings implementing integrated care models. Implementation of the Collaborative Care model in a nurse-managed health center serving a medically underserved population required restructuring visits, team roles, and financing mechanisms, and resulted in measurable improvements in depression and anxiety symptoms for subsets of patients, alongside reported gains in interprofessional collaboration and primary care capacity (Reising et al., 2021, 2022). Historical analyses of nurse-led clinics further position these models as mechanisms for improving access to high-quality, cost-effective primary care in underserved communities, while emphasizing that sustainability is contingent on policy, regulatory, and reimbursement environments (Tobbell, 2024).

Navigation and system-linkage programs provide adjacent evidence for coordination functions commonly undertaken by nursing or interprofessional teams. Systematic reviews indicate that navigation interventions may yield modest improvements in appropriate service utilization and patient experience, though effects on health outcomes and costs remain uncertain and highly context dependent (Teggart et al., 2023). For HNHC populations, syntheses emphasize the importance of individualized engagement, provider support, and tailored care pathways, while noting limited reporting on mechanisms of action and contextual contingencies (Berkman et al., 2021).

Outreach and low-threshold services

Evidence for outreach and low-threshold approaches is strongest where interventions emphasize community partnership, tailored communication, and trust-building. A systematic review of interventions aimed at preventing unequal health outcomes during pandemics and disasters identifies community outreach, collaboration with trusted local actors, and culturally specific communication as essential components, while also noting the limited size and generalizability of the evidence base (Williams et al., 2021). Community engagement models developed by safety-net institutions conceptualize outreach as a foundational function that integrates services, research, education, and policy to address social determinants upstream (Jones et al., 2024; DeHaven et al., 2020).

Historical analyses of nurse-led clinics illustrate that community-based accessibility has long been a core feature of advanced nursing practice, though the effectiveness of low-threshold availability is conditioned by sustained system support and political context (Tobbell, 2024). For undocumented migrants, NGO-linked clinics exemplify low-threshold access pathways but simultaneously reflect systemic exclusion from mainstream services rather than solely innovative service design (Funge et al., 2020).

Culturally safe communication and interpreter-supported care

Interpreter-supported care is consistently identified as a prerequisite for equitable maternity and primary care when language discordance exists. Empirical studies characterizing interpreter demand in maternity hospitals underscore the necessity of professional interpretation to ensure safe communication and positive care experiences (Dawe et al., 2023). Narrative syntheses of immigrant women's maternity experiences similarly highlight culturally and linguistically appropriate care as integral to equitable access and service engagement (Higginbottom et al., 2019). Evidence addressing discrimination against specific groups, such as Romani women, further demonstrates that culturally unsafe practices constitute direct barriers to rights-based care, reinforcing the centrality of culturally safe communication as an outcome-relevant strategy (Watson & Downe, 2017).

Harm reduction approaches

Within the included evidence set, there is insufficient direct evaluation of harm reduction interventions as defined public health strategy packages. Although substance use disorder appears as a component of HNHC profiles and tri-morbidity among homeless populations, the synthesized sources do not assess harm reduction-specific interventions or outcomes, representing a clear gap in the available literature (Berkman et al., 2021; Cornes et al., 2017).

Proxy Outcome Measures

Access and engagement indicators

Across the reviewed literature, access and engagement are most commonly operationalized through utilization- and process-based proxies rather than distal clinical endpoints. Navigation studies frequently employ service utilization patterns and patient-reported experience as outcomes, while equity analytics propose indices based on ambulatory-care-sensitive utilization to detect inequitable reliance on emergency care (Pressman et al., 2019; Teggart et al., 2023). In maternal health, proxy indicators such as antenatal care uptake, facility delivery, and postnatal follow-up are widely used to assess access and equity across the continuum of care (Alamneh et al., 2022; Tiruneh et al., 2021).

Referral completion and follow-up timeliness

Although not uniformly operationalized, referral completion and timely follow-up are implicitly treated as quality indicators across multiple bodies of evidence. Navigation and implementation studies emphasize successful linkage to services as a core mechanism of intervention effectiveness, while realist syntheses of homeless care highlight continuity and handover as critical to preventing readmission and service fragmentation (Cornes et al., 2017; Teggart et al., 2023). These findings support the conceptual validity of referral completion and follow-up timeliness as proxy indicators in equity-oriented models.

Non-clinical equity outcomes

Non-clinical outcomes, including patient experience, trust, discrimination versus validation, and service acceptability, are strongly supported as valid measures of equity-oriented care. Meta-ethnographic synthesis demonstrates that relational and experiential dimensions are central to how marginalized populations experience equity in primary care (Baker et al., 2021). Critiques of performance measurement systems further warn that omission of access and experience domains risks obscuring inequities (Eggleton et al., 2017). These findings legitimate the inclusion of non-clinical outcomes as core components of APHN evaluation frameworks.

Maternal–child proxy outcomes in constrained settings

In low-resource and crisis-like contexts, maternal–child outcomes are most commonly proxied through service coverage, timing, and accessibility indicators. Studies operationalize antenatal care attendance, facility delivery, postnatal care uptake, and timing of care initiation as actionable indicators of system performance and equity (Tiruneh et al., 2021). In undocumented migrant contexts, delayed prenatal care and extreme accessibility failures, such as birth before reaching a clinic, are treated as salient proxies of inequitable access (Tasa et al., 2021).

This discussion interprets the findings of the framework synthesis by examining why bundled, multicomponent interventions are more appropriate for complex vulnerabilities, how needs-based frameworks reshape Advanced Public Health Nursing (APHN) workforce planning and role delineation, the value of proxy outcomes for equity-focused evaluation and policy, and the ethical and epistemic limitations inherent in conceptual frameworks in public health nursing.

First, the synthesized evidence indicates that bundled or multicomponent interventions are more plausible and often more effective than isolated strategies when addressing complex vulnerabilities in primary and community care. Vulnerabilities observed among priority populations are rarely unidimensional; rather, they are characterized by the co-occurrence of chronic physical conditions, behavioral health needs, and social risks. In high-need, high-cost populations, predictors of poor outcomes cluster across clinical, psychosocial, and social domains, and programmatic success has been shown to depend on individualized, adaptive services supported by adequate provider resources (Berkman et al., 2021). Such configurations implicitly require multiple, interacting components such as identification, linkage, longitudinal support, and coordination rather than

single interventions. Similarly, among populations experiencing homelessness, realist synthesis demonstrates that effective intermediate care depends on collaborative planning, reablement, intersectoral integration, and psychologically informed relationship-building to prevent breakdowns at care transitions, reinforcing that engagement, continuity, and clinical care must operate together as a package (Cornes et al., 2017).

The relative advantage of multicomponent approaches is further supported by evidence on service integration. In nurse-managed primary care settings serving medically underserved communities, implementation of the Collaborative Care model required coordinated restructuring of visits, team roles, and financing, and was associated with improvements in depression and anxiety outcomes for subsets of patients (Reising et al., 2021,2022). These effects are inseparable from the combination of components screening, interdisciplinary consultation, follow-up, and access to specialty input underscoring that no single element alone is sufficient. Evidence from navigation programs likewise suggests that team-based or integrated models may improve appropriate utilization and aspects of patient experience, while navigation as a stand-alone component shows variable and often limited effects, highlighting that both composition and implementation of bundles matter (Teggart et al., 2023; Hoeve et al., 2022). In crisis and disaster contexts, reviews further indicate that universal or isolated measures are less effective at mitigating inequities than strategies combining outreach, trusted community partnerships, and culturally specific communication across multiple levels (Williams et al., 2021). At the same time, the literature consistently notes a limitation: many studies inadequately report mechanisms, contextual contingencies, and differential effects, leaving uncertainty regarding which combinations work best, for whom, and under what conditions (Berkman et al., 2021; Teggart et al., 2023).

Second, needs-based frameworks carry important implications for APHN workforce planning and role delineation. Such frameworks shift planning away from task-based counts toward alignment between vulnerability profiles, required functions, and advanced competencies. Given that social and structural determinants explain a substantial share of variation in outcomes and inequities, effective responses must extend beyond biomedical management to include capacities for addressing social context, access barriers, and system coordination (Lew & Sommers, 2022; Reising et al., 2022; Jacko & Sainfort, 2023). Historical and contemporary analyses of nurse-led clinics demonstrate that improving access in underserved communities is inseparable from regulatory authority, credentialing, and reimbursement structures, positioning policy and financing as core determinants of role feasibility rather than peripheral considerations (Tobbell, 2024; Poghosyan & Carthon, 2017).

For APHN specifically, the absence of internationally standardized definitions and role expectations complicates comparative planning and evaluation. The lack of a globally accepted standard for advanced public health nursing has been identified as a persistent structural gap, even as nurse practitioners and other advanced nursing roles are recognized as underutilized resources for advancing universal health coverage and reducing disparities (Rosa et al., 2020; Zlotnick et al., 2024). Needs-based frameworks therefore support role delineation processes that begin with population needs and then define functions, competencies, and scopes of practice accordingly, rather than relying on historically bounded role descriptions. Evidence from role delineation studies and practice pattern analyses supports this approach, emphasizing the value of explicitly

mapping activities and domains to guide workforce design (Nahari et al., 2023). More broadly, equity-oriented learning health system perspectives suggest that APHN roles must encompass competencies in intersectoral collaboration, implementation, measurement, and partnership with communities to operationalize equity goals (Bierman & Mistry, 2023; Locke et al., 2024).

Third, the use of proxy outcomes emerges as a critical strength for equity-focused evaluation and policy decision-making. Proxy indicators capture domains such as effective access, continuity, appropriate utilization, and patient experience that are directly sensitive to population-based nursing interventions and often constitute the mechanisms through which inequities are reduced. Equity analytics for ambulatory-care-sensitive conditions demonstrate how utilization patterns can function as proxies for system performance and access, particularly where vulnerable groups rely on episodic emergency care rather than longitudinal primary care (Pressman et al., 2019). Critiques of performance measurement systems further show that overreliance on clinical effectiveness metrics, coupled with neglect of access and experience measures, risks obscuring inequities and misdirecting incentives (Eggleton et al., 2017; Jacko & Sainfort, 2023).

In coordination-focused interventions, proxy outcomes are especially valuable when distal clinical effects are delayed or uncertain. Reviews of navigation programs illustrate that improvements in utilization and patient experience may be detectable even when impacts on health outcomes, costs, or caregiver burden remain unclear, underscoring the necessity of process and engagement proxies for monitoring equity-relevant change (Teggart et al., 2023). In community clinic implementation, operational proxies such as referral throughput, participation continuity, and linguistic adequacy enable real-time management of equity and feasibility (Rush et al., 2024; Dawe et al., 2023). In maternal and crisis settings, coverage, timing, and geographic accessibility indicators have long served as actionable proxies for inequity, enabling targeted policy responses to service gaps among disadvantaged populations, including undocumented migrants (Yaya et al., 2018; Tschirhart et al., 2023). Collectively, these findings support proxy outcomes as indispensable tools for stratified monitoring, accountability, and iterative improvement in equity-oriented systems.

Finally, important limitations and ethical considerations accompany the use of conceptual frameworks in public health nursing research. Conceptual models risk incompleteness when they insufficiently incorporate macro-level determinants, such as policy and political economy, potentially displacing responsibility onto individuals or organizations and obscuring upstream causes of inequity (McIsaac et al., 2018; Lew & Sommers, 2022). In digital and technology-enabled care, conflating equality with equity can lead to frameworks that inadvertently exacerbate disparities by ignoring differential capacity to benefit, raising ethical concerns about design and implementation (Chaudhuri, 2022; Fujioka et al., 2020). Methodologically, framework development is vulnerable to evidence bias and overgeneralization, particularly where empirical studies are sparse or context specific, as highlighted in chronic care integration and disaster response literature (Jordan & Harrison, 2021; Williams et al., 2021).

Ethically robust frameworks must therefore make values, power relations, and uncertainty explicit. Critical interpretive work in health policy demonstrates that values such as transparency, accountability, and participation are integral to the integrity of conceptual models, not optional add-ons (Vélez et al., 2020). In contexts marked by systemic racism, discrimination, and historical

exclusion, failure to explicitly incorporate these forces risks normalizing injustice within ostensibly neutral frameworks (Eden et al., 2022). Transparency in analytic decision-making is likewise an ethical requirement: maintaining an audit trail enables scrutiny of assumptions and guards against uncritical uptake of conceptual models in policy and practice (Carcary, 2021).

In sum, the discussion underscores that bundled APHN strategies aligned with population needs offer greater plausibility and equity potential than isolated interventions, that needs-based frameworks can inform more responsive workforce planning and role delineation, and that proxy outcomes are essential for equity-oriented evaluation and policy. At the same time, conceptual frameworks must be applied with reflexivity, transparency, and ethical vigilance to ensure they illuminate rather than obscure the structural roots of health inequities.

CONCLUSION

This study advances a needs-based conceptual framework for aligning Advanced Public Health Nursing (APHN) strategies with the dominant vulnerabilities of diverse population groups in primary and community care. By synthesizing evidence across public health, nursing, health services research, and equity-oriented scholarship, the framework integrates three core elements: vulnerable population profiles, bundled APHN strategy packages, and realistic proxy outcome measures. Together, these elements respond to persistent gaps in how APHN interventions are designed, evaluated, and positioned within equity-focused health systems.

The findings underscore that vulnerabilities encountered in real-world primary and community care settings are inherently multidimensional, arising from the intersection of chronic clinical conditions, behavioral health needs, and social and structural risks. As a result, isolated or single-component interventions are unlikely to produce sustained or equitable improvements. In contrast, the proposed framework emphasizes bundled, multicomponent APHN strategies such as combinations of outreach, nurse-led case management, culturally safe communication, and system navigation that are better aligned with the complexity of population needs. This alignment strengthens both the plausibility of intervention impact and the feasibility of implementation in resource-constrained and underserved settings.

A key contribution of the study lies in its implications for APHN workforce planning and role delineation. By shifting the analytic focus from tasks to needs, the framework supports a reorientation of advanced nursing roles toward functions critical for equity, including access facilitation, continuity of care, intersectoral coordination, and action on social determinants. This perspective highlights the importance of regulatory, financing, and organizational conditions that enable APHN practice at full scope and reinforces the need for clearer role definitions and competency mapping, particularly in the absence of internationally standardized APHN models.

The study also demonstrates the central role of proxy outcomes in evaluating equity-oriented APHN interventions. Traditional clinical indicators alone are insufficient to capture the mechanisms through which population-based nursing reduces inequities. By foregrounding proxies related to access, engagement, continuity, appropriate utilization, and patient experience, the framework offers a pragmatic approach to monitoring progress, stratifying outcomes by

vulnerability, and informing policy and resource allocation. These measures enable timely feedback and learning, even when distal clinical outcomes are delayed or difficult to attribute.

Beyond its practical contributions, the framework highlights important ethical and epistemic considerations. Conceptual models are powerful tools for guiding practice and policy, but they must be applied with transparency, reflexivity, and explicit attention to values, power relations, and evidence limitations. By emphasizing auditability, theoretical anchoring, and acknowledgment of uncertainty, this study seeks to support responsible use of conceptual frameworks in public health nursing research and decision-making.

In conclusion, the proposed needs-based APHN alignment framework contributes a structured and equity-oriented approach to designing, implementing, and evaluating population-based nursing interventions. It provides a foundation for more coherent practice planning and accountability while recognizing the complexity and context-dependence of health inequities. Future research should empirically test and refine the framework across diverse health system contexts, examine which strategy bundles are most effective for specific populations, and further develop standardized yet adaptable indicators to support learning health systems committed to equity.

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