ISSN: 2550-794X

International Digital Organization for Scientific Research IDOSRJSR10.300000
IDOSR JOURNAL OF SCIENTIFIC RESEARCH 10(3):19-25, 2025.
https://doi.org/10.59298/IDOSRJSR/2024/10.3.1925

# Precision Public Health Approaches

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## ABSTRACT

Precision public health (PPH) represents an emerging paradigm that integrates data science, epidemiology, genomics, and social determinants of health to deliver more targeted, equitable, and effective population-level interventions. Unlike traditional public health, which relies heavily on aggregated data and generalized interventions, PPH employs stratified, data-driven strategies to identify high-risk subpopulations and tailor responses accordingly. This narrative review synthesizes the conceptual foundations, data systems, analytical methods, governance frameworks, and implementation experiences that define precision public health. It examines the interplay between diverse data sources, administrative, clinical, environmental, and social, and advanced analytics, including predictive modeling, causal inference, clustering, and risk profiling, to enhance the precision of decision-making. Key focus areas include performance and equity metrics, ethical and privacy considerations, stakeholder engagement, and workforce capacity building. Evidence from case studies demonstrates how PPH enhances disease surveillance, early warning systems, targeted interventions, and precision communication. However, significant challenges remain, including data quality limitations, disparities in resource allocation, ethical dilemmas, and unequal access to emerging technologies. The review concludes that realizing the full potential of precision public health requires integrated governance, robust regulatory frameworks, multidisciplinary capacity building, and the prioritization of equity to ensure that technological advancements translate into tangible health gains for all population groups.

**Keywords:** Precision Public Health; Data Analytics; Health Equity; Governance and Ethics; and Targeted Interventions.

## INTRODUCTION

Precision public health incorporates additional indicators in parallel to traditional health data, adopting stratified approaches similar to precision medicine. It embraces comparative risk assessments that enable decision-making for multiple targets and prioritization of interventions across diverse systems. Data-driven governance prioritizes the most effective and equitable options, requiring precise knowledge of their public health impact [1]. States have long collected indicators like mortality rates, if only for death certificates. Institutional mechanisms to support such approaches are already apparent at scale and routinely inform choices on thresholds and actions among disparate issues such as HIV, COVID-19, flu, tobacco, and methamphetamine[2]. Although still embryonic and far from universal, precision public health clearly illustrates the potential for lessons from medicine, epidemiology, and data science to begin transforming public health from a domain dependent on averages and highly aggregated data into a field characterized by stratified and comparable targets and the adoption of accompanying assessment systems. Such advances would complement governance frameworks based on health equity and social determinants of health to ensure that efforts can both prioritize the most challenging impediments and assess their effectiveness specifically for the populations or groups left behind [2].

### Conceptual Foundations of Precision Public Health

Precision public health approaches have evolved through and aside from key developments in epidemiology, genomics, data science, social science, a renewed focus on health inequalities, planetary health, and the growing influence of data-driven approaches to governance [6]. From a conceptual perspective, precision public health draws on four main pillars, each of which has developed both independently and in dialogue with one another. These are precision public health, the 'stratification' movement within the discipline of epidemiology, 'targeted' or

'tailored' interventions, and the stratification of the governance of public health measures [8]. Each of these pillars represents an ongoing area of research in its own right, and there exist overlapping but distinct debates [2].

**Data, Analytics, and Indicators**

The emergence of numerous data sources, advanced analytics, and scalable indicators continues to accelerate the evolution of precision public health [9]. Stakeholders explore these three elements to address pressing population health challenges, design, implement, and monitor effective interventions, and prepare for future threats. Each day, hospitals generate enormous amounts of clinical data through electronic health records, while new data-rich instruments such as mobile health (mHealth) devices gather diverse information on individuals' health [12]. Locational data from mobile telecommunication providers, combined with structural data like land use from planning authorities or topographic characteristics from geological agencies, augment the wealth of spatially referenced data, especially in urban settings. High-resolution environmental data, ranging from air pollution to flooding, are more readily available in real time and link to health information through both multi-terminal and remote sensing instruments. Social media provides insights into both individual behaviour and the dynamics of societal discourse across diverse topics, including health. This abundance of data from multiple sectors, administrative, clinical, environmental, and social, offers the potential to prioritize public health action [3]. However, the associated challenges of completeness, timeliness, bias, harmonization, and confidentiality must be addressed to capitalise on this opportunity [7]. Considerable advances in mathematical and data science methods enable a better understanding of the interplay between these data sources, health determinants, and disease trajectories, supporting the design and targeting of appropriate interventions for delineated sub-populations or settings[9]. Public health analytics now encompass clustering methods such as expands, partitioning around medoid, density-based, and self-organizing maps; predictive data mining techniques including decision trees, penalised regression models, support vector machines, random forests, and neural networks; causal inference methods such as counterfactuals, propensity score matching, and marginal structural models; risk profiling approaches such as multi-state and markov chain models; and various validation strategies for these methods[8]. Data not only inform the design of interventions but also enable tracking of changes in baseline determinants associated with both the interventions themselves and externalities through different combinations of administrative and health data [7]. To maximise the impact of available resources, evaluation frameworks encompassing performance, equity, cost-effectiveness, and implementation outcomes are essential. Performance indicators assess the robustness of inputs, processes, and outputs, while equity indicators benchmark distribution across specified sub-populations or settings. Cost-effectiveness indicators enable comparability between initiatives, and implementation indicators monitor fidelity, reach, dose, and acceptability. Dashboards that integrate multiple dimensions of performance and equity inform resource allocation decisions [4].

**Data Sources and Quality**

Public health is faced with increasingly complex public health challenges that require change or immediate action. Precision public health aims to address specific challenges by delivering targeted interventions that consider the unique characteristics of a subpopulation facing a given challenge [2]. Precision public health states that the more precise the information available to identify a challenge and the people affected, the more effective the response to that challenge will be [4]. To achieve such precision, the concept relies on data from different domains: administrative, surveillance, clinical, environmental, and social [3]. Data must also fulfil completeness, timeliness, bias, harmonization, and privacy criteria. Deploying effective precision public health strategies also calls for a better understanding of the data environment across policy sectors [2].

**Analytical Methods for Stratification**

Stratification methods such as clustering, predictive modelling, causal inference, and risk profiling construct population subdivisions based on combinations of health determinants, outcomes, and intervention effects [4]. The analysis assigns a target count for prioritised outcomes and allocates resources among strata [2]. Stratification forms part of risk-prediction analytics essential for effective decision-making and planning; numerous modelling techniques exist, and systematic literature reviews and guidelines are available [3]. Most statistical models for prediction and causal inference rely on the assumption that if all required factors were known, similar individuals would experience a similar risk, outcome, or treatment effect, known as "conditional exchangeability." This assumption underlies cluster sampling and stratified randomisation strategies [5]. Preliminary work identifies candidate strata and potential health or intervention datasets for stratification. Bayesian methods provide a natural basis for causal modelling, including structural causal modelling and Bayesian networks [2]. These approaches estimate candidate strata across the complete causal diagram and potential outcomes at each stratum, while retaining information about margins and counterfactuals. There is ongoing debate within causal modelling about whether policies should target selected strata considered "causally" or "policy-relevant" [6].

### Metrics and Evaluation Frameworks

A performance metric enables the assessment of public health data analysis performance across diverse settings and geographical locations, while an equity metric permits the evaluation of public health strategies' effects on health inequities [6]. Cost-effectiveness analysis, as a fundamental component of economic evaluation, establishes an efficient framework to quantify the component costs and health outcomes of a public health programme. Finally, implementation outcomes gauge the efficacy of translating analysed data into effective public health actions [2]. Performance metrics aim to define and formulate a benchmark for evaluating a public health programme's effectiveness, facilitating the comparison of systems and measures. The engagement of the public and the incorporation of an equitable perspective into the selected metrics significantly increase buy-in and improve accountability [7]. Alternative indicators and dashboards can also be employed to reflect underlying objectives and strategic priorities effectively. Equity metrics seek to ascertain the extent to which a targeted public health programme benefits deprived [3]. The cost-effectiveness metric quantifies the return accrued from introducing new data streams, with potential further modules to encompass the entire intervention life-cycle. Lastly, implementation outcomes adopt frameworks and measurement tools such as RE-AIM, which encompass reach, effectiveness, adoption, implementation, and maintenance models, to clarify the outcomes of the data collection strategy [5].

### Governance, Ethics, and Equity

Precision public health approaches support data-driven decisions concerning the governance of interventions and enable accountable, collaborative engagement with an array of stakeholders [1]. These approaches emphasize the capture and integration of data on the social determinants of health to formulate equitable population strategies. To facilitate an equitable precision public health approach, professionals should prioritize actions for which substantial epidemiologic and social science evidence exists concerning impact and uptake, particularly within traditionally underserved groups [2]. Precision public health approaches necessarily interact with a diverse set of ethical questions. Stakeholders involved in development and implementation require clarity on their roles and the socio-environmental areas under consideration. Potential harms arising from institutional capacity and related services must inform both structural design and the analysis of subdivided groups [6].

### Governance Structures and Stakeholder Engagement

Increasingly complex and fast-evolving public health challenges, exacerbated by limited resources, broader determinants of health, and climate change, compel unprecedented strategic planning and investment. Community engagement remains crucial for effective public health intervention [7]. Cooperative governance models, involving formal and informal collaboration among public health officials, governmental and non-governmental actors, and agencies, have emerged. Formal models support inter-agency and multi-sectoral collaboration on a range of interrelated community health issues [8]. Compliance with Fairness-Based and Stakeholder Identification and Discrimination-Based policy options enhances the capability of agents to communicate policy and priorities to stakeholder groups and improves the degree of stakeholder satisfaction and agent utility in cooperative governance. Such models reflect government formalisation, stakeholder satisfaction, and national community engagement requirements [9]. Two standard models of public health have evolved alongside the development of community-based responses: the legal model and the managerial paradigm. The legal model concentrates on public health law and health department organization [9]. The managerial paradigm strives to harmonize and rationalize the public health system, especially information dissemination [11]. These evolution objectives complement the development of multiple-criteria decision analysis, which optimally combines a number of attributes, and choice modelling that explicitly connects community, need, demand, and supply at the client level, with health care delivery at the account level [10].

### Ethical Considerations and Privacy

Precision public health approaches must be underpinned by ethical principles, particularly in the collection, analysis, and sharing of sensitive data [13]. Relevant ethical obligations include informed consent, data minimization, transparency, consideration of potential adverse effects, and measures to mitigate any predicted harms [8]. Data minimization reduces privacy concerns proportionately to the volume of data shared; relevant principles specify that only the absolute minimum necessary for achieving the purpose should be collected, with pseudonymization strongly encouraged to prevent direct identification [7]. Transparency in decision-making and the rationale for the selection of indicators is vital to credibility. Predicting potential adverse effects of an indicator or analytic approach allows for advanced countermeasures to be specified and meeting of stakeholder expectations [8].

### Addressing Health Equity and Social Determinants

Evidence from health equity research reveals that greater attention to social determinants is needed [2]. Current public health practices seldom effectively consider systematic underlying determinants within American health systems, even in ongoing efforts to monitor and reduce health disparities [13]. Precision public health can fill this

gap by conducting anticipatory assessments of the social determinants of health invisible to current systems and targeting interventions at these determinants [12]. Such shifting of attention to the social determinants of health operates at a level more fundamental than that of currently appearing health issues, thus anticipating future problems before they arise[14]. For instance, the well-being of lower-income populations of color may remain unaddressed before actual cases of birth defects or lead poisoning appear in public health-monitoring efforts. Epidemiological and other public health scientific measurements of the social determinants of health instead point to the need to devise anticipatory measures to prevent these adverse problems from materializing in the first place [10]. Resolving questions of social-determinant support and missing data constitutes, therefore, an important urgent concern for improving public health attention efforts and for the subsequent protection of health itself among population groups capable of disproportionately suffering from public health and systematic disorders [13].

## Implementations across Public Health Domains

To date, public health approaches have been implemented within four main domains: surveillance, targeted interventions, communication, and workforce development. These processor-implemented precision public health implementations are illustrated through specific examples and corresponding evidence demonstrating their effectiveness, thus clarifying the broader concept [6]. Health surveillance ensures timely monitoring of diseases, risk behaviors, and other health-relevant parameters across populations and temporal dimensions. Precision-surveillance implementations aim to gather data from a wide array of sources on a simplified epidemiological model of pathogens, substances, or behaviors. These diverse data streams are then subjected to statistical anomaly detection that identifies substantial deviations from anticipated patterns of variation. Such deviations trigger alerts that can be delivered through scalable digital channels [7]. Evidence has demonstrated that real-time monitoring and anomaly detection can facilitate earlier detection of hazardous events and more efficient allocation of limited incident-response resources. Targeted interventions concentrate allocation of limited resources on specific locations or population subsets projected to experience the highest burden or poorest outcome following a hazard. Such interventions incorporate innovative analytical models that leverage an extensive range of epidemiological datasets, diverse machine-learning methodologies, and additional datasets that characterize underlying drivers of health across populations, time, and locations [8]. Simulations indicate that the emerging methods outperform previously employed approaches in prioritizing and allocating epidemic-response resources to mitigate future impacts. Precise communication ensures that citizens receive health-related information projected to influence their risks or behaviors through channels and messages expected to enhance uptake and understanding [11]. Precision communication emphasizes tailoring risk messages and behavioral nudges to population segments characterized by varying perceptions of a health threat or inclination to engage in associated risk behaviors. Ethical considerations regarding the potential misuse of communication techniques to promote harmful or otherwise undesirable activities are critical and warrant attention alongside ongoing advancements in rigorous evaluation of public messaging design [9]. Workforce training enhances the skills of public-health practitioners across multiple competencies relevant to precision public health. Required proficiency levels for each competency provide additional training guidance, thereby supporting the building of appropriate curricula. While academic institutions, professional associations, public-sector organizations, and other entities have developed comprehensive lists of essential competencies for public health, many competencies still lack corresponding training materials [13]. Consequently, a parallel initiative seeks to curate and disseminate existing resources pertinent to the aforementioned competencies [14].

## Surveillance and Early Warning Systems

The rapid detection of unusual event patterns, a key aspect of public health surveillance systems, can improve preparedness for emerging health threats and strengthen existing intelligence [7]. Timely event detection relies on the monitoring of multiple data streams, but input from vulnerable groups may be missing [3]. An integrated, real-time system that combines syndromic, climate, and environmental data fusion with spatial clustering has been implemented in the Republic of Macedonia, allowing the careful tracking of priority communicable diseases and risks associated with floods and other disasters and enabling comprehensive monitoring of health-related threats [9].

## Targeted Interventions and Resource Allocation

The large and often disproportionate distributions of health resources have encouraged health authorities in numerous countries to adopt and adapt methodological and analytical capabilities that identify physical and non-physical indicators for targeted interventions [11]. Priority-setting criteria have been proposed considering the burden of disease, cost-effectiveness, equity, feasibility, involvement of stakeholders, and, importantly, political acceptability [2]. The spatial equity in the allocation of health resources can also be enhanced according to a multi-criteria ga-based evaluation model, which, while not exclusively designed for public health, can be extended to address other public health issues by incorporating participatory multicriteria methods [10].

## Precision Communication and Behavioral Influence

Effective risk communication remains paramount to influencing behavioral modifications since such changes can substantially curtail the spread of viruses [2]. Proper risk communication entails conveying accurate and timely information about hazards, thereby influencing risk perception and, ultimately, behavior [5]. Moreover, developments in science, technology, and social contexts mean that traditional communication strategies may no longer suffice. Accordingly, adaptive precision public health approaches advocate for precision communication that tailors message content, channel, form, and timing to specific audiences or settings, thereby remedying the potential ineffectiveness of conventional approaches [8]. Considerations of the mandate and capacity for such tailoring similarly constitute core elements of precision public health [3].

## Workforce Training and Capacity Building

To successfully implement precision public health approaches, the workforce must possess specific competencies along with a well-developed organizational capacity that can be bolstered via structured training as a key capacity-building domain [7]. Core competencies can be classified into foundational skill sets that all public health practitioners should acquire at the outset of their education and training, such as defined in the new Council on Education for Public Health 2020 criteria, and advanced skill sets that subsequent career development or specialized training programs can cultivate for respondents engaged in implementation of precision approaches related to their professional job function [6]. Relatedly, the National Association of County and City Health Officials (NACCHO) has identified a list of systems related to training needed to promote the foundational and advanced competencies for public health practice in general. They encompass a variety of systems, including the education system, a mentoring system, and a system that employs subject matter experts to answer questions [11, 12].

## Evidence Synthesis and Case Studies

Precision public health approaches increasingly employ standardized methods for evidence synthesis and evaluation to enhance rigor, reproducibility, and transparency and address systemic gaps. These methods are particularly relevant for high-priority populations, settings, and timelines [11]. Recent advances further clarify capabilities ranging from comprehensive systematic reviews to rapid, living, scoping reviews and identify complementary modeling approaches, such as eco-epidemiology, as promising avenues for exploration [16]. A selection of representative case studies showcases the diversity of operationalization and implementation, ranging from published reports to ongoing preparation, and illustrates different aptitude levels across the spectrum. Representing a subset of insights compiled from earlier contributions, they highlight selected aspects of existing practice alongside opportunities for broader generalization and adaptation [9]. The examples have been curated to reflect a mixture of illuminating operationalization in epidemiology and health policy, resulting from diverse disciplinary origins. Precision public health engages the principles, methods, and systems of precision medicine. The area has gained substantial interest, motivating the need for comprehensive articulation [10]. Following the formal definition of precision public health, additional framing of stratification, targeted interventions, indicators, and governance considerations clarifies distinctions with traditional public health [12]. Additional scrutiny of aims, anticipated impact, and coverage across populations, settings, and temporal dynamics completes the synthesis. Precision public health prioritizes health equity, recognizing that population-level strategies focused on national, statewide, or countywide figures may fail to address the needs of the most vulnerable groups [11]. Three intersecting data governance frameworks undergird precision public health decision-making. The components of each framework and representatives of their modelling formalisms have been mapped, clarifying the diversity of existing applied and theoretical technical mobilizations [10]. The diverse prioritization of data ecosystem specifications across disciplines, regions, and demographic groups indicates opportunities for further characterizing public health analyses [12]. Potential roles and responsibilities across the spectrum of participants in precision public health pinpoint avenues for extending the underlying concepts. A comprehensive compendium of fully operationalized and documented decisions, conforming to the recent data statement, permits an explicit overview, comparison, and integration of both substance and structure [13].

## Challenges, Limitations, and Risk Management

Precision public health continues to attract great interest and scrutiny. Promising technologies such as genomics and digital tools generate hope that health and well-being can be improved through many better-tailored interventions than are available today[5]. Accordingly, many advocates promote "precision public health" as a means to achieve the greatest population health gains, relying upon historical perspectives, theoretical underpinnings, and illustrations of concrete applications [6]. Others are more skeptical, questioning whether precision public health is scientifically supportable and may even worsen inequalities. Covering various intellectual evolutions that precede, accompany, and nurture this fresh concept reveals the prevailing challenges that presently impede its full realization [14]. Health outcomes among individuals differ in ways that cannot be predicted with either precision or personal data. Existing measures of health states are similarly too crude to represent individual

circumstances faithfully. Limitations in publicly available administrative big data constrain access to personal data that could afford a better match, and most that are accessible remain historical rather than real-time snapshots of conditions [7]. Indicators evidencing health inequities, population distributions, biological attributes, and biometric exposures exist but represent only coarsest summaries of social drivers of health, disparities, and unfulfilled needs. Framing broader questions informing a search for guidance around narrower agendas generally leads to a more productive inquiry and supportive groundwork [2]. Even though it has great promise, precision public health remains in its infancy. Geospatial analysis can hone public health activities, but the field lacks a systematic exploration of population behavior and the governing processes that can deliver greater social well-being. Limitations exist not only concerning the nature of participants' states, the depth of socially relevant proxies, the specificity of frameworks and models capable of shedding light on supply and demand considerations, and insights from other disciplines, but also specific to the transferability of methods, technologies, and systems across different jurisdictions and communities [6]. The concept is not universally understood, and use of the term by different sectors may accordingly lead to misunderstanding and conflict [4].

## Future Directions and Policy Implications

Expanding on the previous section addressing challenges, limitations, and risk management strategies, this section identifies future directions and policy implications for precision public health approaches [13]. The discussion emphasizes four areas warranting particular attention, several of which explicitly align with the overarching research questions outlined in the introduction [12]. The identified priorities are: generating evidence regarding effectiveness, impact, and equity outcomes; formalizing regulatory, legal, and research frameworks governing data use; addressing key practical, theoretical, and ethical hurdles hindering ready transferability of existing methods to new use cases; and developing models for scalable implementation to enhance public health decision-making by lower tiers of government, smaller organizations, and resource-constrained jurisdictions[14–19]. These empirical, institutional, and implementation priorities for further inquiry are situated within the global context of waning momentum in proactive public health initiatives and rising public demand for robust avatar systems capable of monitoring evolving health situations, particularly in the wake of the COVID-19 pandemic [6]. The foregoing discussion has explored the array of available data, indicators, and analytical methods underpinning precision public health approaches, together with illustrative examples and implementation experience representing different domains, contexts, and geographic locations. Yet despite the potential for significant advancements, many approaches remain in the research, pilot, or experimental stage. The need for concerted consideration of the preceding implementation questions has therefore arisen [14].

## CONCLUSION

Precision public health signifies a transformative evolution in how health data, analytics, and governance intersect to guide evidence-based interventions. By integrating high-resolution data from clinical, environmental, and social domains, PPH enables health systems to move beyond generalized policies toward more context-specific, equitable, and effective solutions. Its conceptual foundations, rooted in stratified epidemiology, data science, and tailored intervention design, demonstrate that precision and population health are not mutually exclusive but mutually reinforcing. Nevertheless, the successful operationalization of precision public health depends on several critical enablers. First, data systems must be strengthened to ensure completeness, interoperability, and protection of individual privacy. Second, ethical frameworks and stakeholder participation are vital to prevent exacerbation of existing health disparities. Third, metrics that incorporate performance, equity, and cost-effectiveness are essential for monitoring outcomes and guiding adaptive decision-making. Fourth, investment in workforce development and institutional capacity is necessary to translate analytic insights into actionable public health programs. Despite its challenges, precision public health offers an opportunity to reimagine public health practice in the twenty-first century. By embracing technological innovation alongside equity-centered governance, policymakers and practitioners can foster systems that are responsive, transparent, and inclusive. Ultimately, the future of public health will depend not merely on the accumulation of data but on the capacity to interpret, apply, and govern it responsibly to achieve the shared goal of improved health outcomes for all.

## REFERENCES

1. Winston FK, Puzino K, Romer D. Precision prevention: time to move beyond universal interventions. Injury prevention. 2016 Apr 1;22(2):87-91.
2. Olstad DL, McIntyre L. Reconceptualising precision public health. BMJ Open. 2019 Sep 1;9(9):e030279.
3. Paul-Chima UO, Nneoma UC, Bulhan S. Metabolic immunobridge: Could adipose-derived extracellular vesicles be the missing link between obesity, autoimmunity, and drug-induced hepatotoxicity?. Medical Hypotheses. 2025 Sep 28:111776.
4. Canfell OJ, Kodiyattu Z, Eakin E, Burton-Jones A, Wong I, Macaulay C, Sullivan C. Real-world data for precision public health of noncommunicable diseases: a scoping review. BMC Public Health. 2022 Nov 24;22(1):2166.

5. Armstrong GL, MacCannell DR, Taylor J, Carleton HA, Neuhaus EB, Bradbury RS, Posey JE, Gwinn M. Pathogen genomics in public health. New England Journal of Medicine. 2019 Dec 26;381(26):2569-80.
6. Paul-Chima UO, Nnaemeka UM, Nneoma UC. Could dysbiosis of urban air microbiota be an overlooked contributor to pediatric asthma and neurodevelopmental disorders?. Medical Hypotheses. 2025 Sep 12:111758.
7. McMahon C, Denaxas S. A novel framework for assessing metadata quality in epidemiological and public health research settings. AMIA Summits on Translational Science Proceedings. 2016 Jul 20;2016:199.
8. Buckeridge DL. Precision, equity, and public health and epidemiology informatics–a scoping review. Yearbook of medical informatics. 2020 Aug;29(01):226-30.
9. Awuor L, Meldrum R, Liberda EN. Institutional engagement practices as barriers to public health capacity in climate change policy discourse: lessons from the Canadian province of Ontario. International Journal of Environmental Research and Public Health. 2020 Sep;17(17):6338.
10. Lee LM. Public health surveillance: Ethical considerations. The Oxford handbook of public health ethics. 2019 Jan 8:320.
11. Ugwu OP, Ogenyi FC, Ugwu CN, Ugwu MN. Gut microbiota-derived metabolites as early biomarkers for childhood obesity: A policy commentary from urban African populations. Obesity Medicine. 2025 Sep 1;57:100641.
12. Stikova E, Gjorgjev D, Karadzovski Z. Strengthening the early-warning function of the surveillance system: the Macedonian experience. Emerging and Endemic Pathogens: Advances in Surveillance, Detection and Identification 2010 Aug 10 (pp. 45-58). Dordrecht: Springer Netherlands.
13. Drake TL, Lubell Y, Kyaw SS, Devine A, Kyaw MP, Day NP, Smithuis FM, White LJ. Geographic resource allocation based on cost effectiveness: an application to malaria policy. Applied health economics and health policy. 2017 Jun;15(3):299-306.
14. Yeager VA, Wisniewski JM, Chapple-McGruder T, Castrucci BC, Gould E. Public health workforce self-identified training needs by jurisdiction and job type. Journal of Public Health Management and Practice. 2019 Mar 1;25(2):181-90.
15. Ugwu OP, Okon MB, Alum EU, Ugwu CN, Anyanwu EG, Mariam B, Ogenyi FC, Eze VH, Anyanwu CN, Ezeonwumelu JO, Egba SI. Unveiling the therapeutic potential of the gut microbiota–brain axis: Novel insights and clinical applications in neurological disorders. Medicine. 2025 Jul 25;104(30):e43542.
16. Wallace JW, Horney JA, Wilfert RA, Alexander LK. Assessing Outcomes of Online Training in Public Health: Changes in Individual and Organizational Knowledge and Capacity. Pharmacy. 2013 Sep 27;1(2):107-18.
17. Harder T, Remschmidt C, Haller S, Eckmanns T, Wichmann O. Use of existing systematic reviews for evidence assessments in infectious disease prevention: a comparative case study. Systematic reviews. 2016 Oct 11;5(1):171.
18. Ugwu CN, Ugwu OP, Alum EU, Eze VH, Basajja M, Ugwu JN, Ogenyi FC, Ejemot-Nwadiaro RI, Okon MB, Egba SI, Uti DE. Medical preparedness for bioterrorism and chemical warfare: A public health integration review. Medicine. 2025 May 2;104(18):e42289.
19. Kee F, Taylor-Robinson D. Scientific challenges for precision public health. J Epidemiol Community Health. 2020 Apr 1;74(4):311-4.


**CITE AS: Ahereza Prissy (2025). Precision Public Health Approaches. IDOSR JOURNAL OF SCIENTIFIC RESEARCH 10(3):19-25. https://doi.org/10.59298/IDOSRJSR/2024/10.3.1925**