Systems Tool	Use in a maternal health context	Reference
Causal Loop Diagram Identify leverage points that help shift the whole system and not simply treat the "symptom" of the problem. Have a facilitated conversation to share "mental models" and hypothesize as a group what's driving trends over time.	Identify social determinants of health and factors influencing women's participation in services to prevent HIV transmission. Demonstrate potential benefits of strategies that address multiple preconception risk factors simultaneously and promote integration of preconception care into efforts to prevent maternal and child mortality. Identify how healthcare access, quality, and psychosocial/ socioeconomic consequences affect Non-Hispanic Black Women's (NHBW) maternal mortality ratio, and how an increase in maternal mortality ratio can feed back to health-related initiatives/policies that can change healthcare, quality and social determinants of health and exacerbate MHBW maternal mortality ratios over time. Understand forces contributing to registered nurse shortages and unintended consequences of efforts to address the shortage.	Yourkavitch J, Lich KH, Flax VL, et al. Interactions among poverty, gender, and health systems affect women's participation in services to prevent HIV transmission from mother to child: A causal loop analysis. *PLOS ONE*. 2018;13(5). https://doi.org/10.1371/journal.pone.0197239 Poix S, Elmusharaf, K. Investigating the pathways from preconception care to preventing maternal, perinatal and child mortality: A scoping review and causal loop diagram*. Preventive Medicine Reports*. 2023;36:102274. https://doi.org/10.1016/j.pmedr.2023.102274 Lemke MK, Brown KK, Fallah-Fini S, Hall A, Obasanya M. Complex systems and participatory approaches to address maternal health disparities: Findings from a system dynamics group model building project in North Texas. *American Journal of Community Psychology*. 2023;71:303–316. https://doi-org.libproxy.lib.unc.edu/10.1002/ajcp.12636 National MCH Workforce Development Center. Causal Loop Diagramming in Five Minutes. Learning Guide Video. Accessed: October 30, 2023. Available: https://mchwdc.unc.edu/resources/causal-loop-diagramming-in-five-minutes/

Concept Mapping Elicit stakeholders' opinions about a focus question and process this information to identify themes and priorities.	Map the system of postpartum care to identify levers for its transformation. Identify consensus and priorities for maternal child health workforce development training.	Cornell A, McCoy C, Stampfel C, et al. Creating New Strategies to Enhance Postpartum Health and Wellness. *Matern Child Health J.* 2016;20(1):39–42. https://doi.org/10.1007/s10995-016-2182-y National MCH Workforce Development Center. Concept Mapping in Five Minutes. Learning Guide Video. Accessed: October 30, 2023. Available: https://mchwdc.unc.edu/resources/concept-mapping-in-five-minutes/
Iceberg Identify underlying structures and root causes of a challenge to identify potential entry points for change.	Understanding the underlying structures that make addressing chronic conditions among birthing persons challenging to resolve.	Smith C, Fatima H, McClain E, Bryant K, Verbiest S, Hassmiller Lich K. Supporting reproductive health among birthing persons with chronic conditions in the United States: A qualitative multilevel study using systems thinking to inform action. *Health Serv Res.* 2023;58(2):521-533. doi: 10.1111/1475-6773.14131.
Network Mapping Visually display connections and relationships between individuals or organizations in a system.	Document local, cross-sector decision landscape that formed in response to COVID-19, to identify the impacts different organizations may have on information/misinformation, prevention behaviors, and, ultimately, health. Identify organizations for collaboration with the Title V maternal health program in Colorado.	Biddell CB, Johnson KT, Patel MD, et al. Cross-sector decision landscape in response to COVID-19: A qualitative network mapping analysis of North Carolina decision-makers. *Front. Public Health.* 2022;10:906602. doi: 10.3389/fpubh.2022.906602 National MCH Workforce Development Center. Network Mapping in Five Minutes. Learning Guide Video. Accessed: October 31, 2023. Available: https://mchwdc.unc.edu/resources/network-mapping-in-five-minutes/
Balance of Petals Visualize stakeholders for an initiative, what they need to contribute and what they receive in return to discover imbalances in what stakeholders give/get from a project.	Identify ways to increase family, youth and community engagement within all maternal and child health programs.	National MCH Health Workforce Development Center. Balance of Petals in Five Minutes. Learning Guide Video. Accessed: October 31, 2023. Available: https://mchwdc.unc.edu/resources/balance-of-petals-in-five-minutes/

5 R's See the system in which you are working in terms of Results, Roles, Resources to support change, Rules, and Relationships.	Assess key dimensions of systems (results, roles, relationships, rules and resources) to uncover and discuss key factors and outcomes relevant to maternal health disparities among Non-Hispanic Black Women.	Lemke MK, Brown KK, Fallah-Fini S, Hall A, Obasanya M. Complex systems and participatory approaches to address maternal health disparities: Findings from a system dynamics group model building project in North Texas. *American Journal of Community Psychology.* 2023;71:303–316. https://doi-org.libproxy.lib.unc.edu/10.1002/ajcp.12636
Process Flow Diagramming Create a map of a current process to help redesign, improve, or create a new process, or to document and clarify the role of people/ organizations in a process.	Understand and improve MCH systems and position them for policy reform, with examples from Georgia, Hawaii and Colorado.	National MCH Workforce Development Center. Using Process Flow Diagramming to Understand and Improve MCH Systems. Presentation. Accessed: October 31, 2023. Available: https://www.mchnavigator.org/transformation/resources/using-process-flow-diagramming-mch-systems.php
Behavior over Time (BOT) Graphs Share perspectives on what is creating trends over time and come closer to developing a shared understanding of the challenge.	Advance thinking and discussions about MCH challenges, trends and factors influencing change. Identify the dynamics of maternal health disparities among Non-Hispanic Black Women over time according to participants' mental models, with a focus on the "stories" of what caused outcomes to change over time, and when changes occurred.	Calancie L, Anderson S, Branscomb J, Apostolico AA, Lich KH. Using Behavior Over Time Graphs to Spur Systems Thinking Among Public Health Practitioners. *Prev Chronic Dis.* 2018;15:E16. doi: 10.5888/pcd15.170254 Lemke MK, Brown KK, Fallah-Fini S, Hall A, Obasanya M. Complex systems and participatory approaches to address maternal health disparities: Findings from a system dynamics group model building project in North Texas. *American Journal of Community Psychology.* 2023;71,303–316. https://doi-org.libproxy.lib.unc.edu/10.1002/ajcp.12636
Whole System Mapping Inventory programs, resources, and services within a system you want to strengthen.	Develop a high-level view of key contributors of services for children and youth with special needs in order to identify gaps, reduce duplication, and implement policies.	National MCH Workforce Development Center. Whole System Mapping in Five Minutes. Learning Guide Video. Accessed: October 31, 2023. Available: https://mchwdc.unc.edu/resources/whole-system-mapping-in-five-minutes/

Asset Mapping Map and analyze information about assets in a system or state to meet a common goal.	Identifying all efforts throughout Indiana that are supporting breastfeeding.	National MCH Workforce Development Center. Asset Mapping: Starting System Change With What You Already Have. Learning Guide Video. Accessed: October 30, 2023. Available: https://www.mchnavigator.org/transformation/2190-asset-mapping/story_html5.html
System Support Mapping Map an individual's responsibilities, needs, resources, and wishes which can be used to support meeting MCH consumers' needs, setting up a team for success or defining and strengthening a system of individuals.	Assess MCH staff discrete responsibilities, key needs, and specific resources required for implementing a Title V program.	Calancie L, Margolis L, Chall S, Mullenix A, Chaudhry A, Hassmiller Lich K. System Support Mapping: A Novel Systems Thinking Tool Applied to Assess the Needs of Maternal and Child Health Title V Professionals and Their Partners. *Journal of Public Health Management and Practice*. 2020;26(4):E42-E53. doi:10.1097/PHH.0000000000000941