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Impact of infectious diseases on maternal and neonatal outcomes in clinical and community settings

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Abstract

Infectious diseases continue to be a major cause of poor maternal and neonatal health outcomes worldwide, affecting both high-income and low- and middle-income countries. Despite advances in antenatal care, antibiotics, and public health systems, infections during pregnancy still contribute significantly to maternal deaths, preterm birth, low birth weight, neonatal sepsis, and long-term developmental complications. This narrative review examines recent evidence on how infectious diseases affect maternal and neonatal health across both clinical and community settings. The review explores infections such as COVID-19, HIV, malaria, syphilis, and chorioamnionitis to show how disease-specific factors interact with broader social conditions, healthcare systems, and structural inequalities to shape outcomes. Five major themes emerge from the literature: the global burden of maternal and neonatal infections; the clinical effects and mechanisms of specific pathogens; socioeconomic and structural factors that increase vulnerability; health system issues such as infection surveillance, antimicrobial stewardship, and quality of care; and behavioral and psychosocial influences on infection risk and treatment outcomes. The findings highlight that no single intervention is sufficient to reduce the burden of infectious diseases in pregnancy. Clinical care alone cannot fully address these challenges without strong health systems, effective surveillance, community engagement, and broader structural improvements. Overall, the evidence supports integrated, multi-level approaches as essential for reducing preventable maternal and neonatal illness and death worldwide.

Keywords: Infectious diseases; Maternal outcomes; Neonatal outcomes; Maternal mortality; Neonatal sepsis

1. Introduction

Infections during pregnancy remain a major threat to maternal and newborn health worldwide. Pregnancy naturally brings hormonal, immune, and physiological changes that can make both mothers and babies more vulnerable to a wide range of infections (Melange et al., 2023). These infections can directly contribute to maternal and neonatal deaths or lead to serious complications such as preterm birth, stillbirth, intrauterine growth restriction, and neonatal sepsis (Mazzoni et al., 2025). Although advances in obstetric care and infectious disease management have improved outcomes in many settings, preventable infection-related maternal and infant deaths remain especially common in low- and middle-income countries where healthcare systems often face significant resource limitations (McDonald et al., 2022).

The COVID-19 pandemic brought renewed attention to the impact infectious diseases can have on pregnant women and newborns. Studies showed that SARS-CoV-2 infection during pregnancy was linked to higher risks of preterm birth, cesarean delivery, intensive care admission, and, in some cases, maternal and perinatal death (Chmielewska et al., 2021; Allotey et al., 2020). At the same time, long-standing infections such as HIV, malaria, syphilis, and tuberculosis continue to place a heavy burden on maternal and neonatal health, particularly in sub-Saharan Africa and South Asia. For

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example, pregnant women living with HIV face increased risks of low birth weight, preterm delivery, and mother-to-child transmission, although early antiretroviral treatment can significantly reduce these risks (Atowoju et al., 2024).

The effects of pregnancy-related infections are also shaped by broader social and structural conditions. Factors such as poverty, education, access to antenatal care, and overall health system capacity strongly influence outcomes (Ajayi & Cudjoe-Mensah, 2025). Women in underserved urban and rural communities often face delayed diagnosis, limited treatment options, weak infection surveillance systems, and reduced social support, all of which increase vulnerability (Nortey et al., 2025). As a result, the burden of infectious disease falls disproportionately on populations already facing social and economic disadvantage.

Healthcare settings themselves also influence outcomes. Differences in hospital quality, staffing levels, and infection prevention practices can lead to major variations in maternal and neonatal outcomes across facilities (Amofah & Oware, 2025). Community-based healthcare approaches, including primary healthcare services, community health worker programs, and home-based care, are equally important, especially in areas where access to hospitals and specialized care remains limited. New technologies such as digital health systems, machine learning, and spatial analysis are improving disease surveillance and supporting earlier diagnosis and treatment (Ssemujju & Solomon, 2026; Ugwu et al., 2025). However, limited digital infrastructure in many high-burden regions continues to restrict the full benefits of these innovations.

Although many studies focus on individual infections separately, there is still limited understanding of how multiple infections and different care settings interact to influence maternal and neonatal outcomes. This review addresses that gap by bringing together evidence across multiple infections and healthcare contexts to support more integrated and effective approaches to maternal and newborn health.

2. Literature Search Strategy and Inclusion Criteria

Relevant literature for this review was identified through systematic searches of major academic databases, including PubMed, Google Scholar, Scopus, and Web of Science. The search was focused primarily on publications from 2020 to 2026, a timeframe chosen to capture the most recent evidence on infectious diseases and maternal-neonatal outcomes, including the substantial body of research generated in response to the COVID-19 pandemic, as well as emerging evidence on endemic infections and health system responses.

Search terms were developed to comprehensively cover the scope of the review. These included primary terms such as infectious diseases in pregnancy, maternal infections, neonatal infections, maternal mortality, neonatal mortality, neonatal sepsis, preterm birth, and vertical transmission. Disease-specific terms were incorporated to capture evidence on key infections, including COVID-19, SARS-CoV-2, HIV in pregnancy, malaria in pregnancy, syphilis and pregnancy outcomes, chorioamnionitis, and infection-related preterm birth. Additional terms addressed setting-specific and structural dimensions, including community-based maternal care, clinical settings and neonatal outcomes, health system factors and infectious disease, antimicrobial stewardship, and socioeconomic determinants of maternal health.

Studies were included if they: (1) examined maternal or neonatal outcomes associated with infectious diseases during pregnancy, labor, or the early postnatal period; (2) addressed clinical, community, or health system dimensions of infectious disease management in maternal and neonatal populations; (3) were published in peer-reviewed journals or produced by recognized public health institutions and research organizations; and (4) provided original empirical evidence, systematic reviews, meta-analyses, or narrative reviews relevant to the topic.

Key reports and publications from authoritative public health bodies, including the World Health Organization and national health agencies, were additionally incorporated where they contributed nationally or globally representative data on infectious disease burden and maternal-neonatal outcomes.

3. Thematic Synthesis

The literature included in this review was examined using a thematic synthesis approach to identify broader patterns across studies rather than focusing on individual infections or isolated outcomes. The analysis explored how epidemiological, clinical, and structural factors interact to shape the impact of infectious diseases on maternal and neonatal health in both healthcare facilities and community settings. Themes were developed gradually from the evidence and refined through comparisons across studies, allowing for a more integrated understanding of the literature.

The findings show that infectious diseases affect maternal and neonatal outcomes through two closely connected pathways. The first involves direct biological effects, such as fetal infection, placental inflammation, preterm labor, and neonatal sepsis. The second involves wider social and health system conditions, including limited access to healthcare, socioeconomic disadvantage, and weaknesses within healthcare systems, all of which influence how severe infections become and how outcomes are distributed across populations (Chmielewska et al., 2021; Obeagu & Obeagu, 2024). In this sense, outcomes are shaped not only by exposure to infection itself, but also by the conditions under which healthcare is accessed, delivered, and maintained.

The review also highlights clear disparities in outcomes across settings. Women living in low-resource or marginalized communities face significantly greater risks because they are more likely to encounter barriers such as poor access to healthcare services, inadequate antenatal care, and limited disease surveillance systems (Nortey et al., 2025; Ajayi & Cudjoe-Mensah, 2025; Amofah & Oware, 2025; Ugwu et al., 2025).

From this analysis, five major thematic areas emerged. Together, these themes capture both the direct clinical effects of infectious diseases and the broader structural conditions that shape maternal and neonatal health outcomes across the continuum of care.

3.1. Theme 1: Global Epidemiological Burden of Infectious Diseases on Maternal and Neonatal Health

The global burden of infectious diseases on maternal and neonatal health is substantial and persists despite decades of sustained public health intervention. Infectious etiologies account for a significant proportion of both direct and indirect maternal deaths worldwide, encompassing not only obstetric infections such as sepsis and chorioamnionitis, but also endemic and epidemic diseases including HIV, malaria, tuberculosis, and, most recently, COVID-19 (Malange et al., 2023; Mazzoni et al., 2025; Obeagu & Obeagu, 2024). This burden is deeply unequal in its distribution, with low- and middle-income countries, particularly those in sub-Saharan Africa and South Asia, shouldering the greatest share of preventable infection-related maternal and neonatal mortality, a pattern that reflects not only pathogen exposure but the structural conditions that determine access to care (McDonald et al., 2022; Ajayi & Cudjoe-Mensah, 2025; Nortey et al., 2025).

Among neonates, infections represent one of the leading causes of mortality globally, accounting for an estimated 30 percent of all neonatal deaths. Neonatal sepsis, pneumonia, and meningitis, often arising from maternal infections transmitted vertically or acquired during the delivery process, are prominent contributors to this burden (Jones & Nunes, 2022; Fan et al., 2025; Mazzoni et al., 2025). The majority of these deaths occur in settings characterized by inadequate antenatal care coverage, limited access to skilled birth attendance, and fragile health system infrastructure, underscoring the central and irreplaceable role of health system capacity in shaping neonatal infection outcomes (McDonald et al., 2022; Amofah & Oware, 2025; Ugwu et al., 2025). Early-onset neonatal sepsis, arising within 72 hours of birth, is predominantly associated with maternal genital tract pathogens, while late-onset sepsis reflects a more complex interplay of hospital-acquired and community-transmitted organisms, each demanding distinct clinical and public health responses (Fan et al., 2025; Jones & Nunes, 2022; Obeagu & Obeagu, 2024).

The COVID-19 pandemic provided a stark and sobering illustration of the particular vulnerability of pregnant women to emerging infectious diseases, as well as the cascading consequences of pandemic-related disruptions on maternal and neonatal health systems globally. A systematic review and meta-analysis by Chmielewska et al. (2021) demonstrated that the pandemic was associated with significantly increased risks of maternal death, stillbirth, and preterm birth, with effects mediated both by direct SARS-CoV-2 infection and by pandemic-induced disruptions to antenatal care services (Chmielewska et al., 2021; Li et al., 2025; Smith et al., 2023). These findings align with broader evidence consistently showing that epidemic and pandemic threats result in measurable deterioration of maternal and neonatal health outcomes, particularly in settings where health systems are already under strain (Mazzoni et al., 2025; Malange et al., 2023; McDonald et al., 2022).

Temporal trends in the epidemiology of maternal infectious disease reflect meaningful and consequential shifts in the leading contributors to infection-related mortality. While the historical burden was dominated by direct obstetric infections, the contemporary landscape increasingly reflects the growing contribution of indirect infections, particularly HIV, tuberculosis, and malaria, each of which is exacerbated by the profound immunological adaptations of pregnancy (Malange et al., 2023; Obeagu & Obeagu, 2024; Atowoju et al., 2024). These shifts demand a broadened epidemiological perspective, one that moves decisively beyond obstetric-focused frameworks to encompass the full spectrum of infectious threats to maternal and neonatal health. Integrated surveillance systems capable of capturing this expanded and evolving disease profile are increasingly recognized as essential infrastructure for effective, timely, and equitable public health responses (Ssemujju & Solomon, 2026; Ugwu et al., 2025; Saito et al., 2024).

3.2. Theme 2: Pathogen-Specific Clinical Mechanisms and Neonatal Consequences

Infectious diseases affect maternal and neonatal health through a range of distinct biological mechanisms, the nature and severity of which vary depending on the specific pathogen involved and the immunological responses characteristic of pregnancy. One of the most consequential pathways is intraamniotic infection, commonly referred to as chorioamnionitis, in which microbial invasion of the amniotic cavity triggers inflammatory responses that can precipitate preterm labor, premature rupture of membranes, and serious neonatal complications including sepsis, neurological injury, and chronic lung disease (Fan et al., 2025; Mazzoni et al., 2025; Jones & Nunes, 2022). This inflammatory process remains one of the principal mechanisms through which infection-related preterm birth continues to contribute substantially to global neonatal morbidity and mortality (Fan et al., 2025; McDonald et al., 2022).

Different pathogens exert their influence through distinct and often overlapping mechanisms. HIV compromises maternal and neonatal outcomes through immune suppression, placental infection, and complications associated with inadequately managed disease, with risks shaped by maternal viral load, immune status, treatment timing, and coexisting infections such as malaria (Atowoju et al., 2024; Obeagu & Obeagu, 2024). Although antiretroviral therapy has substantially improved outcomes, HIV-exposed but uninfected infants continue to face elevated risks of infection, developmental challenges, and mortality (Jones & Nunes, 2022; Atowoju et al., 2024; Ajayi & Cudjoe-Mensah, 2025). COVID-19 disrupts pregnancy through systemic inflammation, coagulation abnormalities, and placental dysfunction, contributing to elevated rates of preterm birth, cesarean delivery, and severe maternal illness (Allotey et al., 2020; Li et al., 2025; Chmielewska et al., 2021). While vertical transmission remains uncommon, newborns may experience respiratory complications when maternal illness is severe (Li et al., 2025; Smith et al., 2023).

Malaria in pregnancy, particularly Plasmodium falciparum infection, causes placental malaria through parasite accumulation and localized inflammation, resulting in maternal anemia, fetal growth restriction, and low birth weight, with risks most pronounced among primigravidae and women living with HIV (Obeagu & Obeagu, 2024; Atowoju et al., 2024; Malange et al., 2023). Congenital malaria further contributes to neonatal illness, while syphilis during pregnancy risks stillbirth, neonatal death, and long-term neurological damage, outcomes that remain largely preventable through timely antenatal screening and treatment (McDonald et al., 2022; Mazzoni et al., 2025).

The clinical risks of individual infections are frequently compounded by multimorbidity. Conditions such as HIV, tuberculosis, anemia, and hypertension commonly coexist during pregnancy, increasing clinical complexity and substantially raising the likelihood of adverse outcomes (Kizza & Oware, 2025; Obeagu & Obeagu, 2024; Atowoju et al., 2024). These patterns reinforce the case for integrated, comprehensive antenatal care models designed to address multiple concurrent conditions simultaneously, rather than managing infections in isolation from their broader clinical and social context (McDonald et al., 2022; Amofah & Oware, 2025; Gordon et al., 2025).

3.3. Theme 3: Socioeconomic and Structural Determinants of Infectious Disease Vulnerability

Socioeconomic and structural factors are among the most powerful determinants of women's vulnerability to infectious diseases during pregnancy and their capacity to receive timely, effective care. Income, education, employment, and insurance coverage influence not only healthcare access, but also living conditions, nutritional status, and patterns of infectious disease exposure, all of which bear directly on maternal and neonatal outcomes (Ajayi & Cudjoe-Mensah, 2025; McDonald et al., 2022; Nortey et al., 2025). These conditions rarely operate independently; rather, they overlap and reinforce one another, generating compounding layers of disadvantage that simultaneously elevate infection risk and reduce the likelihood of favorable outcomes (Ajayi & Cudjoe-Mensah, 2025; Kizza & Oware, 2025).

Poverty remains one of the most consistent drivers of infection-related maternal and neonatal mortality. Women in low-income households are disproportionately likely to live in overcrowded or unsanitary conditions that heighten infectious disease exposure, while simultaneously facing substantial barriers to quality care (Gordon et al., 2025; Obeagu & Obeagu, 2024; Amofah & Oware, 2025). Financial costs associated with transportation, consultations, and medications frequently delay treatment, allowing infections such as malaria, urinary tract infections, and sepsis to reach dangerous severity before care is received, with serious downstream consequences for both mothers and newborns (Obeagu & Obeagu, 2024; Mazzoni et al., 2025; McDonald et al., 2022).

Social support constitutes another frequently underappreciated determinant of maternal health. Strong support networks encourage antenatal care attendance, adherence to preventive interventions such as HIV testing and malaria prophylaxis, and effective management of psychosocial stress during pregnancy. Conversely, limited social support,

particularly in rural and isolated communities, measurably increases vulnerability and constrains access to essential care and information (Nortey et al., 2025; Ssemujju & Solomon, 2026; Gordon et al., 2025).

Racial and ethnic disparities in maternal and neonatal outcomes further reflect structural inequalities embedded within healthcare systems and broader society. Structural racism, implicit provider bias, and unequal exposure to social and environmental risks continue to shape outcomes even after accounting for socioeconomic differences (Ajayi & Cudjoe-Mensah, 2025; Gordon et al., 2025; Amofah & Oware, 2025). The absence of culturally responsive care compounds these disparities, while evidence consistently demonstrates that culturally appropriate interventions improve engagement, trust, and clinical outcomes among marginalized populations (Gordon et al., 2025; Nortey et al., 2025).

Geographic location adds a further dimension of structural disadvantage. Women in rural and remote areas contend with long travel distances, provider shortages, and limited diagnostic and treatment capacity, barriers that delay early diagnosis and increase the risk of preventable complications (Ssemujju & Solomon, 2026; Nortey et al., 2025; McDonald et al., 2022). Emerging tools including spatial modeling and machine learning are increasingly being deployed to identify high-risk areas and guide more targeted health interventions (Ssemujju & Solomon, 2026; Ugwu et al., 2025; Saito et al., 2024). Taken together, these interconnected challenges underscore the need for equity-focused strategies that simultaneously address healthcare access and the broader upstream conditions shaping maternal and neonatal health outcomes (Ajayi & Cudjoe-Mensah, 2025; McDonald et al., 2022; Ugwu et al., 2025).

3.4. Theme 4: Health System Factors; Surveillance, Stewardship, and Care Quality

Health system characteristics are fundamental determinants of how infectious diseases affect maternal and neonatal outcomes. A system's capacity to prevent, detect, and manage infections during pregnancy and the neonatal period depends critically on infrastructure quality, workforce capacity, governance structures, and resource availability, all of which vary considerably across and within countries (Ugwu et al., 2025; Amofah & Oware, 2025; McDonald et al., 2022).

Infectious disease surveillance constitutes one of the most essential functions of an effective maternal health system. Early identification of outbreaks, rapid detection of emerging infections, and timely reporting of maternal and neonatal cases are indispensable for preventing severe complications and reducing preventable mortality. Yet in many high-burden settings, surveillance systems remain chronically underfunded and structurally fragmented, limiting their capacity to capture the true scale of maternal and neonatal infection burden (Ugwu et al., 2025; Ssemujju & Solomon, 2026). Emerging technologies, including spatial modeling and machine learning, are increasingly being explored as mechanisms for strengthening surveillance infrastructure, enabling earlier outbreak detection and more precisely targeted public health responses (Ssemujju & Solomon, 2026; Saito et al., 2024; Oware & Mensah, 2025).

Antimicrobial stewardship has similarly emerged as a critical strategy in the management of infections during pregnancy and the neonatal period. These programs promote the appropriate, evidence-based use of antibiotics with the dual aim of optimizing patient outcomes and curtailing the development of antimicrobial resistance, a growing threat to maternal and neonatal care globally (Amofah & Oware, 2025; Ugwu et al., 2025). In maternity and neonatal settings, where antibiotics are routinely deployed to manage conditions such as chorioamnionitis, neonatal sepsis, and preterm prelabor rupture of membranes, stewardship programs provide essential clinical governance frameworks that support timely and rational treatment decisions (Amofah & Oware, 2025; Fan et al., 2025; Mazzoni et al., 2025).

The quality of antenatal care represents another decisive influence on infection-related maternal and neonatal outcomes. Effective antenatal services encompass routine screening for infections including HIV, syphilis, hepatitis B, and urinary tract infections, alongside preventive interventions such as malaria prophylaxis and tetanus immunization (Mazzoni et al., 2025; McDonald et al., 2022; Obeagu & Obeagu, 2024). Evidence consistently demonstrates that women who access quality antenatal care face substantially lower risks of complications including maternal sepsis, low birth weight, and preterm birth, reinforcing the centrality of antenatal care investment in any serious maternal health strategy (Allotey et al., 2020; Chmielewska et al., 2021; Atowoju et al., 2024).

Digital health technologies are creating expanding opportunities to strengthen maternal and neonatal infection management across both facility and community settings. Electronic health records, telemedicine platforms, point-of-care diagnostic tools, and wearable monitoring devices collectively support earlier diagnosis, real-time clinical monitoring, and improved coordination of care across levels of the health system (Saito et al., 2024; Ugwu et al., 2025; Ssemujju & Solomon, 2026). Predictive modeling tools that leverage patient data hold additional promise for identifying women at elevated risk of infection-related complications and improving the efficiency of resource allocation (Oware & Mensah, 2025; Saito et al., 2024). The transformative potential of these technologies, however, remains constrained in

many high-burden settings by inadequate digital infrastructure and deeply unequal access, limiting their reach precisely where the need is greatest (Ssemujju & Solomon, 2026; Ugwu et al., 2025).

Community-based health platforms are equally indispensable, particularly in settings where access to formal healthcare facilities is limited or unreliable. Community health workers play a vital role in early infection identification, health education, care referral, and the delivery of preventive interventions such as malaria prevention counseling and HIV testing support (Ugwu et al., 2025; Nortey et al., 2025; Gordon et al., 2025). Their effectiveness, however, is contingent on robust and sustained linkages with formal healthcare systems, ensuring that community-level identification and intervention translate into continuity of care through to facility-based management (Ugwu et al., 2025; Amofah & Oware, 2025; McDonald et al., 2022).

3.5. Theme 5: Behavioral, Psychosocial, and Community-Level Determinants

Behavioral and psychosocial factors are increasingly recognized as consequential influences on infectious disease risk and outcomes among pregnant women and newborns, operating simultaneously at individual, household, and community levels, and shaped by the broader socioeconomic and structural conditions that define the environments in which women live and seek care (Ajayi & Cudjoe-Mensah, 2025; Nortey et al., 2025; Gordon et al., 2025).

Health-seeking behavior stands out as one of the most critical determinants of pregnancy outcomes. Early initiation of antenatal care, consistent adherence to preventive treatments, and timely medical attention upon symptom onset are essential for reducing infection-related complications (McDonald et al., 2022; Mazzoni et al., 2025). Research by Gordon et al. (2025) demonstrates that culturally competent care models improve healthcare engagement in underserved communities by reducing delays in care-seeking and strengthening participation in infectious disease prevention programs, reinforcing the importance of antenatal services that are clinically effective, culturally responsive, and structurally accessible (Gordon et al., 2025; Ugwu et al., 2025; Nortey et al., 2025).

Perinatal mental health conditions, including depression and anxiety, further contribute to infectious disease vulnerability. Poor mental health can weaken immune function, reduce adherence to medical recommendations, and increase engagement in risk-associated behaviors (Gordon et al., 2025; Kizza & Oware, 2025). The relationship is frequently cyclical, as stress and depression may heighten susceptibility to infection, while infectious illness can intensify psychological distress (Gordon et al., 2025; Malange et al., 2023). This dynamic was especially evident during the COVID-19 pandemic, when social isolation, financial hardship, and health-related anxiety simultaneously deepened mental health challenges and amplified infection risks for pregnant women (Allotey et al., 2020; Chmielewska et al., 2021; Li et al., 2025).

Social support networks provide a well-documented protective effect across the maternal health continuum. Women with strong family, peer, or community support are consistently more likely to attend antenatal visits, adhere to preventive regimens, and seek care promptly when symptoms arise (Nortey et al., 2025; Gordon et al., 2025; Ajayi & Cudjoe-Mensah, 2025). Community-based programs incorporating peer support groups and community health workers reduce structural barriers to engagement, including transportation challenges and childcare responsibilities, while cultivating the trust that encourages consistent healthcare participation (Ugwu et al., 2025; Nortey et al., 2025; Amofah & Oware, 2025).

Substance use during pregnancy, encompassing tobacco, alcohol, and illicit drug use, constitutes a further modifiable risk factor associated with compromised immune function, nutritional deficiencies, and increased exposure to sexually transmitted infections (Malange et al., 2023; Obeagu & Obeagu, 2024). Its frequent co-occurrence with poverty, housing instability, and mental health conditions generates complex, compounding risk profiles that demand integrated rather than isolated clinical responses (Kizza & Oware, 2025; Ajayi & Cudjoe-Mensah, 2025).

At the community level, health communication networks, cultural beliefs, and trusted local leaders shape how pregnant women perceive infectious disease risks and respond to prevention programs. Community-driven strategies engaging trusted social networks have demonstrated effectiveness in improving participation in HIV testing, malaria prevention, and immunization programs (Ugwu et al., 2025; Gordon et al., 2025; Ssemujju & Solomon, 2026). These findings affirm that infectious disease prevention during pregnancy is fundamentally a social process, shaped by the relational, cultural, and structural contexts within which women navigate their health (Ajayi & Cudjoe-Mensah, 2025; Nortey et al., 2025; McDonald et al., 2022).

4. Conceptual Framework of Infectious Disease Impact on Maternal and Neonatal Outcomes

The five themes within the multilevel determinants' framework (Figure 1) collectively highlight the complex factors that influence infectious disease outcomes for mothers and newborns across both clinical and community settings. Pathogen-specific clinical mechanisms form the biological basis of harm, contributing to maternal mortality, preterm birth, and neonatal sepsis through direct infection, inflammatory responses, and the effects of multiple coexisting conditions. Socioeconomic and structural factors shape underlying vulnerability by influencing exposure to infectious risks and access to protective resources and healthcare services. Health system factors, including disease surveillance, antimicrobial stewardship, quality antenatal care, and digital health innovations, determine how effectively infections are identified, managed, and prevented. At the same time, behavioral and psychosocial factors influence whether available interventions are utilized and maintained, particularly through health-seeking behavior, social support, and community engagement.

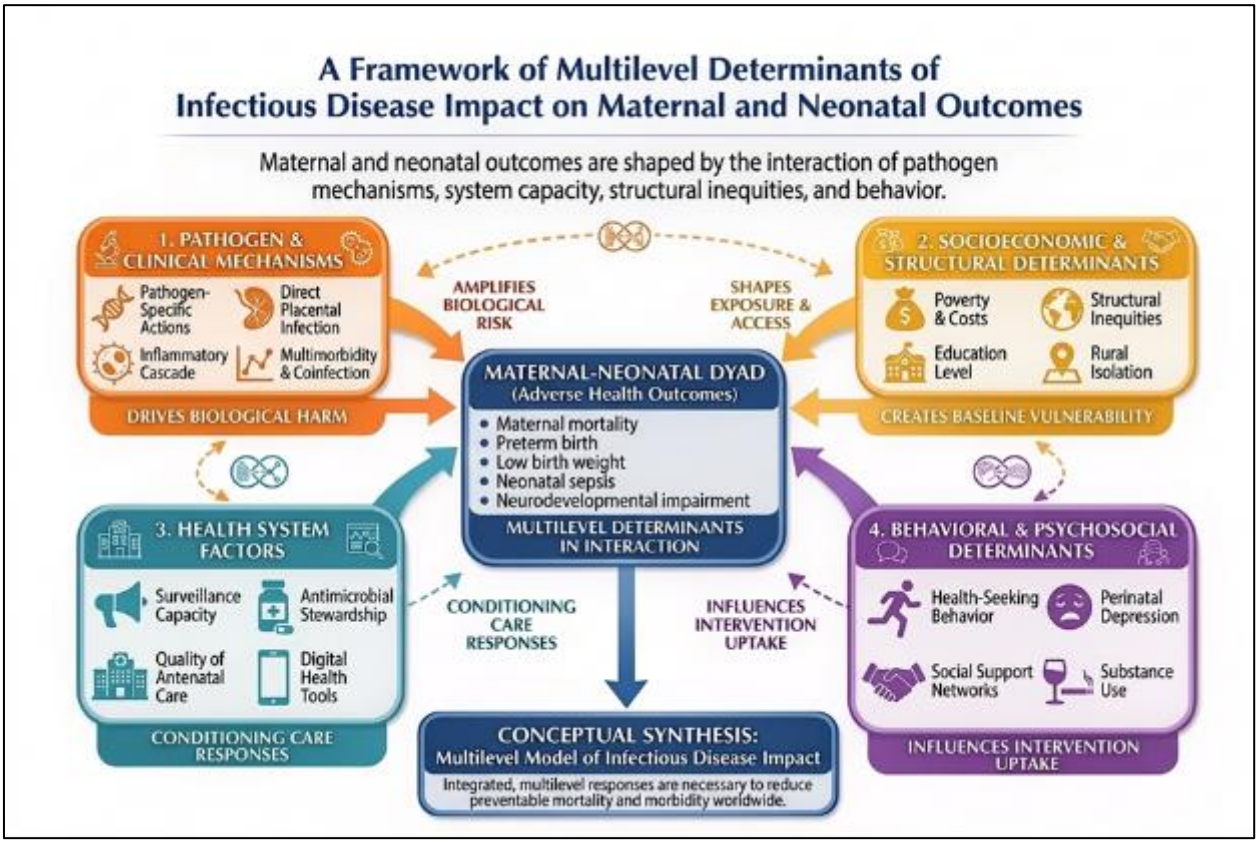

Figure 1 Conceptual Model of Multilevel determinants on the impact of infectious diseases (Author's construct, 2026)

Together, these domains create a system in which infectious disease impact on maternal and neonatal outcomes is accessible to multilevel analysis and intervention; one that is simultaneously biological, structural, systemic, and behavioral. This framework lays the foundation for integrated, equity-centered responses to infectious disease burden across maternal and neonatal health systems worldwide, ensuring that interventions are not only clinically effective but structurally responsive and community-grounded.

5. Conclusion

The evidence reviewed in this paper makes clear that reducing the infectious disease burden on maternal and neonatal outcomes demands considerably more than improvements in the clinical management of specific pathogens. It calls for integrated health systems that deliberately combine effective, disease-specific treatments with equitable access to antenatal care, strengthened health infrastructure, and community-responsive behavioral interventions capable of reaching the most vulnerable populations. While progress in areas such as antiretroviral therapy, malaria prevention, and COVID-19 management demonstrates that meaningful reductions in infection-related harm are achievable, these gains remain fragile in contexts where structural inequalities, weak surveillance systems, and persistent behavioral barriers continue to undermine their reach and long-term durability.

The increasing integration of digital health technologies, predictive analytics, and artificial intelligence-driven surveillance into maternal and neonatal care introduces both significant opportunities and meaningful risks. These tools carry genuine potential to enhance early detection, support clinical decision-making, and improve service delivery at scale. However, they also risk reinforcing existing disparities if deployed without deliberate attention to equity, data governance, and the cultivation of community trust. Responsible, inclusive, and equity-conscious implementation of digital innovations must therefore be positioned as a central and non-negotiable pillar of infectious disease strategy in maternal and neonatal health.

Ultimately, achieving sustained reductions in maternal and neonatal mortality and morbidity linked to infectious diseases requires a comprehensive, multilevel commitment that spans clinical, structural, and community dimensions. This means ensuring universal access to quality antenatal care, strengthening surveillance and health system response capacity, addressing the socioeconomic determinants of vulnerability, and embedding community engagement as a foundational rather than peripheral component of health programming. Such an integrated approach represents the most credible pathway to protecting mothers and newborns from preventable infectious disease risks during one of the most consequential periods of human life, regardless of where they are born, how much they earn, or the structural conditions that surround them.

References

[1] Ajayi, A. A., & Cudjoe-Mensah, Y. M. (2025). Impact of socioeconomic factors on health outcomes. *Int J Applied Res Soc Sci*, *7*(3).

[2] Allotey, J., Fernandez, S., Bonet, M., Stallings, E., Yap, M., Kew, T., ... & Thangaratinam, S. (2020). Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *bmj*, *370*.

[3] Amofah, A. D., & Oware, E. (2025). Economic and Clinical Impact of Optimizing Antimicrobial Stewardship Programs in US Hospitals: A Comprehensive Review. *Journal Of Internal Medicine And Public Health*, *4*(5), 59-70.

[4] Atowoju, I., Dawer, P., Asrani, M., & Panjiyar, B. (2024). Impact of maternal HIV infection on perinatal outcomes: A systematic review. *International Journal of Gynecology & Obstetrics*, *166*(1), 35-43.

[5] Chmielewska, B., Barratt, I., Townsend, R., Kalafat, E., Van Der Meulen, J., Gurol-Urganci, I., ... & Khalil, A. (2021). Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. *The Lancet Global Health*, *9*(6), e759-e772.

[6] Fan, S., Li, Q., Feng, Q., Zhao, P., & Zhang, X. (2025). Infection-Related preterm birth. *Maternal-Fetal Medicine*, *7*(03), 172-180.

[7] Gordon, J., Oware, E., & Cudjoe-Mensah, Y. M. (2025). Assessing the impact of culturally competent crisis intervention on mental health outcomes in underserved U.S. communities. EPRA *International Journal of Multidisciplinary Research*, 11(6), 561.

[8] Jones, S., & Nunes, M. C. (2022). Beyond COVID-19: Equitable epidemiology for studying the impact of maternal infections on neonatal mortality and morbidity. *Paediatric and Perinatal Epidemiology*, *36*(4), 553.

[9] Kizza, T., & Oware, E. (2025). Multimorbidity and Mortality: A Review of US Evidence and Modelling Approaches. *Journal Of Internal Medicine And Public Health*, *4*(5), 28-34.

[10] Li, Y., Lu, Y., Tang, H., Spector, E. A., Wen, X., Germinal, K., ... & Guo, J. (2025). Neonatal outcomes among pregnant women with COVID-19: a systematic scoping review and meta-analysis. *BMC Pregnancy and Childbirth*, *25*(1), 948.

[11] Malange, V. N., Hedermann, G., Lausten-Thomsen, U., Hoffmann, S., Voldstedlund, M., Aabakke, A. J., ... & Hedley, P. L. (2023). The perinatal health challenges of emerging and re-emerging infectious diseases: a narrative review. *Frontiers in public health*, *10*, 1039779.

[12] Mazzoni, A., Berrueta, M., Pingray, V., Babinska, M., Nigri, C., Ortega, V., ... & Bonet, M. (2025). A systematic review of maternal and perinatal health outcomes in the context of epidemic threats: towards the development of a core outcome set. *Maternal Health, Neonatology and Perinatology*, *11*(1), 23.

[13] McDonald, C. R., Weckman, A. M., Wright, J. K., Conroy, A. L., & Kain, K. C. (2022). Developmental origins of disease highlight the immediate need for expanded access to comprehensive prenatal care. *Frontiers in Public Health*, *10*, 1021901.

[14] Nortey, R. T., Egbunu, A. S., & Oware, E. (2025). Barriers to social support access in urban vs. rural older adults U.S. populations: A scoping review. *Sarcouncil Journal of Medicine and Surgery*, 4(11), 1–10.

[15] Obeagu, E. I., & Obeagu, G. U. (2024). Protecting maternal health: strategies against HIV and malaria in pregnancy. *Medicine*, *103*(36), e39565.

[16] Oware, D. A., & Mensah, S. (2025). Developing advanced predictive models for patient flow forecasting in healthcare facilities: A systematic review and analysis. *International Journal of Frontline Research in Life Science*, 3(2), 19–25.

[17] Saito, S., et al. (2024). Advancing the management of maternal, fetal, and neonatal infection through harnessing digital health innovations. The Lancet Digital Health. https://doi.org/10.1016/S2589-7500(24)00217-6

[18] Smith, S., Birnie, K., Draper, E., & Gale, C. (2023). Neonatal outcomes and indirect consequences following maternal SARS-CoV-2 infection in pregnancy: a systematic review. *BMJ Open*. PMC10030282.

[19] Ssemujju, F. S., & Solomon, D. (2026). Integrating Spatial Modeling and Machine Learning for Infectious Disease Surveillance in US Urban and Rural Settings. *Journal Of Internal Medicine And Public Health*, *5*(1), 1-12.

[20] Ugwu, D., Amofah, A. D., & Kaiser, F. (2025). Enhancing the detection and response to infectious disease outbreaks. *International Medical Science Research Journal*, 5(2), 81–90.