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From Digital Childhoods to Predictive Health Systems: The Role of Artificial Intelligence and Multimorbidity Research in Shaping the Future of Public Health in South Asia

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Abstract

South Asia stands at a pivotal moment in its public health journey, where rapid digital adoption intersects with escalating burdens of chronic and infectious diseases. This article explores the interplay between three emerging dimensions—digital childhoods, artificial intelligence (AI) in predictive medicine, and multimorbidity research—and argues that their convergence will shape the trajectory of health outcomes in the region. The increasing prevalence of smartphone use among preschoolers in urban South Asian contexts reflects both technological penetration and shifting cultural patterns of child-rearing. While mobile devices serve as tools for early learning and connectivity, problematic use has been linked to attention deficits, impaired social interaction, and sedentary lifestyles, creating the potential for long-term vulnerabilities such as obesity, anxiety, and poor mental health. At the same time, healthcare systems in South Asia, long challenged by shortages of skilled professionals and uneven access to quality services, are beginning to leverage AI-driven predictive models for cancer recurrence, survival analysis, and risk stratification. These innovations demonstrate promise in tailoring care, optimizing resource allocation, and bridging the gaps between prevention, diagnosis, and treatment in resource-constrained environments. The COVID-19 pandemic further exposed structural weaknesses in regional health systems, where high mortality rates among patients with diabetes, hypertension, and cardiovascular diseases underscored the critical role of multimorbidity and diagnostic biomarkers in shaping outcomes. These findings suggest that chronic disease management cannot be siloed but must be integrated into broader predictive health frameworks. By weaving together evidence on childhood digital behaviors, advances in AI-driven healthcare, and the systemic challenges of multimorbidity, this article advances a unified vision for predictive and resilient health systems in South Asia. It calls for a public health paradigm that addresses risks from early life stages, integrates technological innovations responsibly, and ensures equitable access across diverse populations. Ethical considerations—including algorithmic fairness, data privacy, and cultural sensitivity—remain central to this transformation.

Keywords: digital childhoods; problematic smartphone use; artificial intelligence; predictive analytics; cancer survival prediction; chronic disease management; multimorbidity; COVID-19 mortality; biomarkers; public health equity; South Asia

1. Introduction

South Asia is experiencing a profound transformation at the intersection of technology, health, and society. With more than 1.8 billion people, the region represents one of the fastest-growing digital markets in the world, driven by increasing smartphone penetration, expanding internet connectivity, and a youthful population that is adopting digital tools at an unprecedented pace. While this digital revolution has created opportunities for education, communication, and economic participation, it has also introduced new public health challenges, particularly as digital devices permeate the lives of children from a very early age. In urban centers across Bangladesh, India, Nepal, and Pakistan,

studies increasingly report high rates of smartphone exposure among preschool-aged children, raising concerns about problematic use and its long-term consequences for cognitive, social, and emotional development. This phenomenon, often overlooked in public health discourse, represents an emerging determinant of health that will influence generational well-being across South Asia.

At the same time, the region continues to grapple with dual disease burdens. On one hand, infectious diseases such as tuberculosis, dengue, and COVID-19 remain pressing threats; on the other, non-communicable diseases (NCDs) such as diabetes, cancer, and cardiovascular illnesses are on the rise, fueled by urbanization, lifestyle changes, and aging populations. The COVID-19 pandemic dramatically highlighted the vulnerability of South Asian populations, especially those with pre-existing conditions. Mortality among critically ill patients with multimorbidity—including diabetes, hypertension, and cardiovascular disease—was disproportionately high, pointing to both structural limitations in intensive care delivery and the urgent need to integrate multimorbidity management into public health planning. These outcomes underscore that health systems in South Asia must shift from reactive to predictive approaches if they are to withstand future health crises and chronic disease pressures.

Artificial intelligence (AI) is increasingly being positioned as a solution to this challenge. From oncology to cardiology, AI-based predictive models are enabling clinicians to anticipate cancer recurrence, assess survival probabilities, and personalize treatment pathways. Such tools hold transformative potential in South Asia, where shortages of healthcare professionals and inequitable access to advanced diagnostic technologies often leave patients with late-stage diagnoses and limited treatment options. Predictive analytics, when integrated into clinical practice, could empower healthcare providers to allocate resources more effectively, improve early detection, and tailor interventions to individual risk profiles. However, the deployment of AI in healthcare must contend with infrastructural, ethical, and cultural barriers unique to South Asian contexts, including limited digital infrastructure in rural areas, disparities in health literacy, and concerns about data privacy and algorithmic bias.

Bringing these dimensions together—childhood digital behaviors, AI-enabled healthcare, and multimorbidity research—offers a novel perspective on the future of public health in South Asia. Problematic smartphone use among children illustrates the ways in which digital lifestyles can seed health vulnerabilities early in life. AI-driven predictive tools demonstrate how technology can simultaneously address gaps in clinical practice and resource management. The lessons from COVID-19 mortality among patients with multimorbidity highlight the systemic fragility of health systems and the importance of integrated care pathways. Taken together, these insights argue for a unified, forward-looking health framework that links prevention, prediction, and management across the lifespan.

This article examines the convergence of these three domains to propose a roadmap for building predictive, resilient, and equitable health systems in South Asia. It emphasizes the need for context-specific strategies that harness digital technologies responsibly, account for social and cultural realities, and promote equitable access across diverse populations. In doing so, it advances a vision of public health where early behavioral interventions, AI innovations, and multimorbidity management are not treated as isolated issues but as interconnected priorities essential for achieving sustainable health outcomes in the region.

2. Digital Childhoods and Public Health Implications

The increasing prevalence of digital technologies in South Asia has fundamentally reshaped childhood experiences, with smartphones becoming a dominant feature of early development. In urban households of Bangladesh, India, and neighboring countries, mobile devices are frequently introduced to children before the age of five, often as tools of distraction, early learning, or social engagement. While this reflects broader patterns of digital penetration across the region, it also raises critical concerns regarding the developmental and health implications of early, unsupervised, or excessive use. Research from Dhaka, for instance, highlights a significant proportion of preschoolers

engaged in problematic smartphone use, characterized by compulsive behaviors, dependency, and reduced participation in traditional forms of play and socialization.

The public health implications of these trends are multifaceted. Excessive screen time during early childhood has been associated with reduced attention span, delayed language acquisition, disrupted sleep cycles, and increased risks of obesity and sedentary lifestyles. Equally concerning are the psychosocial effects, including diminished interpersonal communication skills and heightened vulnerability to anxiety or behavioral disorders. These outcomes, while documented in global contexts, take on particular urgency in South Asia, where urban families often rely on digital devices to compensate for limited access to structured childcare and educational resources. Moreover, the lack of widespread parental awareness regarding safe digital practices amplifies the risks, leaving children exposed to long-term vulnerabilities that could carry into adolescence and adulthood.

From a policy perspective, the rise of digital childhoods calls for a re-examination of how early behavioral health determinants are integrated into broader public health frameworks. Current health agendas in South Asia tend to prioritize infectious diseases, maternal and child mortality, and non-communicable diseases in adulthood, but they rarely account for the influence of early-life digital exposure on lifelong health trajectories. As smartphone penetration deepens, this oversight risks leaving a generation of children vulnerable to developmental and health challenges that may remain invisible until they manifest as chronic conditions later in life.

Addressing this emerging issue requires a holistic approach that balances the benefits of digital technologies with their potential risks. Smartphones can, when used responsibly, provide access to educational applications, health awareness campaigns, and parent–child engagement platforms.

However, without regulatory frameworks, parental guidance, and culturally relevant awareness programs, the line between beneficial and problematic use becomes blurred. For South Asia, where the demographic dividend depends heavily on the well-being and productivity of its youth, ensuring that digital adoption during early childhood does not translate into long-term public health burdens is essential. Recognizing problematic smartphone use as a legitimate public health issue represents the first step toward embedding digital childhoods into the discourse on preventive health strategies in the region.

3. Artificial Intelligence in Predictive Medicine and Survival Analysis

Artificial intelligence (AI) is rapidly transforming healthcare delivery worldwide, and its role in predictive medicine has become especially significant for regions like South Asia, where health systems face chronic challenges of resource scarcity, unequal access, and overwhelming patient loads. Predictive analytics powered by AI offers the ability to anticipate disease progression, recurrence, and survival outcomes, enabling clinicians to make informed, data-driven decisions. This capacity is particularly relevant in oncology, where AI-based models are being deployed to predict cancer recurrence and estimate patient survival probabilities with higher accuracy than conventional statistical tools. Such innovations can profoundly impact treatment planning, allowing for early intervention, personalized therapeutic regimens, and optimized allocation of scarce clinical resources.

In South Asia, the adoption of predictive AI models has the potential to mitigate longstanding barriers in healthcare. Cancer care, for instance, is often hampered by late-stage diagnoses, limited diagnostic infrastructure, and shortages of specialized oncologists. By analyzing clinical, genomic, and imaging data, AI systems can help identify high-risk patients at earlier stages, thereby improving survival rates and reducing the economic burden of advanced treatments. Beyond oncology, predictive AI tools are increasingly being explored for chronic conditions such as cardiovascular disease and diabetes, both of which are rising sharply in South Asian populations. For countries grappling with dual disease burdens, the ability to forecast risks before they manifest in acute episodes could represent a paradigm shift from reactive care to preventive and proactive health management.

Equally important is the potential of AI to address inequities in healthcare delivery. In rural and semi-urban regions of South Asia, where access to advanced diagnostic facilities is limited, AI-enabled tools embedded in telemedicine platforms or mobile applications could extend predictive care beyond urban hospitals. This would allow for early detection of risk factors even in under-resourced settings, reducing disparities in outcomes across geographic and socioeconomic divides. Such applications align with the region's increasing reliance on mobile health technologies, suggesting a natural synergy between AI and existing digital health ecosystems.

However, integrating AI into predictive medicine in South Asia is not without its challenges. Data quality and availability remain significant constraints. Health records are often fragmented, paper-based, or incomplete, which limits the development of robust and reliable predictive models. Furthermore, ethical and regulatory questions surrounding patient privacy, algorithmic bias, and informed consent require careful attention, particularly in countries where data protection laws are still evolving. Without deliberate safeguards, there is a risk that AI systems may inadvertently reinforce existing health inequities, privileging those with access to digital healthcare while marginalizing the most vulnerable populations.

Despite these barriers, the momentum toward AI adoption in healthcare is undeniable. Governments, academic institutions, and private sector innovators across South Asia are beginning to explore pilot programs and partnerships aimed at integrating AI into health service delivery. While still at an early stage, these efforts point to a future where predictive analytics becomes a cornerstone of clinical practice, reshaping survival outcomes for millions of patients. The challenge lies in ensuring that such systems are adapted to the sociocultural and infrastructural realities of South Asia, so that predictive AI becomes not merely a technological import but a contextually relevant tool for achieving equitable health gains.

4. Multimorbidity, COVID-19, and Health System Vulnerabilities

The COVID-19 pandemic exposed structural weaknesses in health systems worldwide, but its effects were especially pronounced in South Asia, where multimorbidity—defined as the coexistence of two or more chronic conditions—proved to be a critical determinant of patient outcomes. In Bangladesh and neighboring countries, evidence from intensive care units revealed disproportionately high mortality rates among patients with comorbidities such as diabetes mellitus, hypertension, cardiovascular disease, and chronic respiratory illnesses. These conditions, already prevalent in the region due to genetic predispositions, lifestyle transitions, and environmental stressors, intensified the severity of COVID-19 infections and overwhelmed hospitals that were ill-equipped to manage complex clinical profiles.

The intersection of multimorbidity and infectious disease outbreaks underscores a broader vulnerability within South Asian health systems. Unlike in high-income countries where multimorbidity is typically associated with aging populations, in South Asia it is increasingly seen across middle-aged adults, reflecting earlier onset of chronic diseases and limited access to preventive care. This demographic shift has far-reaching implications: when individuals in their most economically productive years are disproportionately affected by multimorbidity, the economic and social costs extend beyond the health sector to workforce productivity, household income stability, and national development trajectories.

COVID-19 amplified these vulnerabilities by creating a surge in demand for intensive care and ventilatory support, which far outstripped supply. The burden of multimorbidity meant that patients often presented with multiple organ dysfunctions, complicating treatment and increasing mortality risk. Diagnostic biomarkers, which could have supported early risk stratification, were often inaccessible in underfunded hospitals, leaving clinicians with limited tools for clinical decision-making. As a result, outcomes for multimorbid patients in South Asia were far poorer than global averages, revealing the urgent need to integrate chronic disease management into broader health emergency preparedness strategies.

The implications extend beyond the pandemic itself. Multimorbidity is not a temporary phenomenon but a growing public health reality in South Asia. The combination of rapid urbanization, changing dietary patterns, air pollution, and sedentary lifestyles is accelerating the incidence of chronic conditions such as diabetes and hypertension. When layered onto infectious disease risks—including tuberculosis, dengue, and emerging pathogens—the region faces a dual burden that places unprecedented strain on already fragile systems. Without systemic reforms, future pandemics or health crises may reproduce the same patterns of disproportionate mortality among multimorbid patients.

Addressing this challenge requires a reorientation of health policy toward integrated care models. Traditional approaches in South Asia have often been disease-specific, focusing on vertical programs for tuberculosis, malaria, or maternal health. While effective in isolated domains, such fragmentation fails to account for patients with overlapping conditions. The COVID-19 experience illustrates the dangers of such compartmentalization: a diabetes patient with COVID-19 does not benefit from siloed programs but requires comprehensive, coordinated care spanning multiple specialties. Investing in multimorbidity research, strengthening diagnostic infrastructure, and training healthcare workers in interdisciplinary care pathways are therefore essential steps toward resilience.

Equally critical is the role of predictive analytics and AI in this domain. By leveraging patient records, biomarkers, and clinical histories, AI systems could identify high-risk multimorbid patients before they deteriorate, enabling timely interventions and reducing ICU mortality. Thus, multimorbidity research not only highlights current vulnerabilities but also sets the stage for technological solutions that could mitigate future crises.

5. The Convergence of Digital Behavior, AI, and Multimorbidity Research

The three thematic strands discussed—problematic digital behaviors in early childhood, the role of AI in predictive medicine, and the burden of multimorbidity during COVID-19—may appear distinct at first glance, yet they converge within a broader framework of health trajectories, technological disruption, and systemic vulnerability in South Asia. Examining them together offers valuable insights into how digital environments, predictive tools, and chronic disease dynamics interact across the lifespan, shaping both individual health outcomes and collective system resilience.

At the earliest stages of life, the rise of problematic smartphone use among preschool-aged children highlights the profound influence of digital technologies on cognitive, emotional, and behavioral development. Excessive or unsupervised digital exposure during these formative years has been linked to sleep disturbances, reduced attention spans, delayed social skills, and early signs of addictive behaviors. In South Asia's densely populated urban centers, where smartphones often double as childcare substitutes, the scale of this issue raises concerns about the long-term health implications of digital dependency. Importantly, these early-life behavioral patterns may establish a foundation for future vulnerabilities, such as sedentary lifestyles, mental health challenges, and increased susceptibility to chronic conditions.

As individuals progress into adolescence and adulthood, the consequences of early digital overexposure intersect with other health determinants, including genetics, diet, environment, and healthcare access. This is where artificial intelligence enters the equation. Predictive models in healthcare are designed to identify risk factors, disease progression, and survival probabilities. If integrated with data on digital behaviors and lifestyle patterns, AI could provide a more holistic understanding of health risks across the lifespan. For example, a child's prolonged exposure to digital screens might be linked in predictive algorithms to future risks of obesity, diabetes, or mental health disorders. Such integration would enable clinicians and policymakers not only to address immediate health concerns but also to anticipate and mitigate long-term consequences of digital-era lifestyles.

The convergence becomes even more pronounced in the context of multimorbidity. The COVID-19 pandemic underscored how chronic conditions amplify vulnerabilities during health crises. Here, predictive AI systems could play a pivotal role by identifying multimorbid patients at highest risk of

complications and by enabling early, targeted interventions. Yet these same patients often have digital footprints—health app usage, smartphone behaviors, or telemedicine interactions—that could further enrich predictive models. Thus, linking digital behavior research with multimorbidity analytics has the potential to create a new generation of preventive health strategies. Instead of treating multimorbidity as a late-stage clinical challenge, health systems could trace its precursors back to lifestyle and behavioral patterns observable decades earlier.

This convergence also highlights critical policy implications. Digital health governance, child protection in technology use, and AI regulation cannot be pursued in isolation. Rather, they must be integrated into a unified health strategy that acknowledges how digital exposure, predictive technologies, and chronic disease burdens overlap in shaping public health outcomes. For South Asia, this means that interventions should not only regulate children's screen time or deploy AI in oncology but also consider how these interventions interact within a larger ecosystem of health inequalities, infrastructural constraints, and cultural practices.

Ultimately, connecting the dots between digital behavior, predictive AI, and multimorbidity research underscores the need for a life-course approach to health. Early childhood interventions in digital literacy and parental guidance, combined with adolescent education on healthy lifestyles, adult access to predictive AI-driven care, and elderly-focused multimorbidity management, would create a continuum of care that addresses health risks at every stage. Such a framework positions South Asia not merely as a region struggling to catch up with global health innovations, but as a potential pioneer in integrating behavioral science, technological prediction, and systemic resilience into a coherent model for 21st-century healthcare.

6. Policy, Ethical, and Socioeconomic Dimensions

The convergence of digital childhoods, predictive artificial intelligence, and multimorbidity underscores not only biomedical and technological challenges but also profound questions of governance, ethics, and socioeconomic equity. In South Asia, where healthcare infrastructures are often under-resourced, and where socioeconomic disparities shape access to both technology and healthcare, the risks of exacerbating inequalities are significant. Addressing these challenges requires a multidimensional perspective that integrates regulatory safeguards, ethical principles, and socially inclusive policies.

From a policy standpoint, the regulation of digital technology use among children remains largely fragmented in South Asia. While some global guidelines recommend age-appropriate screen time limits, such frameworks are not yet institutionalized in national child health or education policies. This lack of formal oversight leaves families to navigate digital parenting without adequate support, often resulting in children being overexposed to smartphones in ways that jeopardize developmental health. Similarly, policies governing artificial intelligence in healthcare are in their infancy. Although AI offers immense promise in predicting cancer recurrence, managing multimorbidity, and improving survival rates, few countries in the region have robust frameworks that address algorithmic transparency, data privacy, and patient consent. Without these protections, there is a risk of implementing AI systems that not only misrepresent clinical realities but also erode patient trust.

Ethical issues further complicate this landscape. The use of AI in predictive medicine requires access to vast amounts of personal and clinical data, raising questions about privacy, ownership, and consent. In South Asia, where data governance systems are less developed, patients may not be adequately informed about how their data is used or protected. Moreover, predictive algorithms trained on datasets from high-income countries may reproduce biases when applied to local populations, leading to misclassification of risk or inequitable allocation of healthcare resources. The ethical implications are particularly acute when considering vulnerable groups, such as children exposed to early digital behaviors or multimorbid patients with limited health literacy. The principle of beneficence demands that these populations not only benefit from innovation but also be shielded from potential harms caused by misuse or neglect.

The socioeconomic dimensions of this convergence are equally pressing. Access to digital technologies and AI-driven healthcare is unequally distributed across South Asia. Urban, middle-class families may rely heavily on smartphones, exposing children to higher risks of problematic use, while simultaneously being better positioned to access AI-powered diagnostic tools. In contrast, rural or low-income communities may face limited digital exposure but also lack access to the potential benefits of predictive healthcare systems. This uneven distribution risks creating a dual burden: affluent populations grappling with overexposure to digital risks, and marginalized groups left out of AI-driven healthcare altogether. Bridging this divide requires not only technological deployment but also investments in infrastructure, health literacy, and community-based awareness programs.

The interplay between socioeconomic conditions and multimorbidity further complicates matters. As the COVID-19 pandemic demonstrated, patients with diabetes, hypertension, or other chronic conditions are disproportionately represented among lower-income groups, who also face barriers to healthcare access. The introduction of AI systems in such contexts must therefore be designed with affordability and scalability in mind, ensuring that predictive medicine does not become a privilege for the wealthy but a tool of equity and inclusion. Moreover, these systems must be embedded within broader strategies to strengthen primary care, improve diagnostic capacity, and address the social determinants of health.

Finally, the cultural and political dimensions of governance cannot be ignored. Parental attitudes toward digital use, societal trust in AI technologies, and political will to regulate global tech companies all influence how these challenges are addressed. In contexts where regulatory oversight is weak and commercial interests are strong, there is a risk of policies being driven more by market dynamics than by child health, patient welfare, or equity. A forward-looking policy agenda must therefore balance technological innovation with ethical responsibility, grounded in principles of fairness, transparency, and justice.

In sum, the policy, ethical, and socioeconomic dimensions of digital behavior, predictive AI, and multimorbidity highlight the need for a holistic governance framework. This framework must simultaneously regulate digital childhoods, safeguard data rights, mitigate algorithmic bias, and reduce inequities in access to care. Only by embedding these principles into health and technology policy can South Asia harness the potential of digital innovation while protecting its most vulnerable populations from unintended harms.

7. Future Directions for Integrated Health Systems in South Asia

The convergence of digital childhoods, artificial intelligence, and multimorbidity research calls for a paradigm shift in how health systems in South Asia are designed, governed, and sustained. Future directions must focus not only on technological innovation but also on system-level integration, equity, and cultural adaptability. This is particularly vital in a region marked by rapid demographic changes, high burdens of chronic disease, and growing exposure to digital technologies from the earliest stages of life.

A central direction lies in the integration of predictive analytics into primary and secondary healthcare systems. Rather than limiting AI applications to tertiary or specialized care, where only a minority of patients can access advanced facilities, predictive algorithms must be embedded in community clinics, district hospitals, and mobile health platforms. For example, AI-driven tools could be deployed to flag children at risk of problematic smartphone use based on behavioral assessments collected in schools, while also supporting early interventions for families. At the same time, predictive models for cancer recurrence and multimorbidity risks should be adapted for resource-constrained settings, ensuring that community health workers and local physicians can utilize these insights without requiring expensive infrastructure or specialized expertise.

The future of integrated health systems also depends on cross-sector collaboration. Public health authorities, educational institutions, technology providers, and community organizations must work in tandem to address the interconnected challenges of digital behaviors and chronic disease management. In practice, this could involve joint policies that regulate early childhood screen time,

incentivize healthy digital habits, and simultaneously invest in AI systems that strengthen surveillance and early detection of diseases. Such collaborations should prioritize culturally sensitive approaches, recognizing the diversity of linguistic, socioeconomic, and religious contexts across South Asia. A standardized, one-size-fits-all model risks alienating vulnerable populations and undermining trust in both public health campaigns and technological interventions.

The role of digital literacy cannot be overstated. For families, digital literacy must go beyond teaching parents how to operate devices to include an understanding of how early childhood exposure impacts development, and how to manage technology use responsibly. For patients, particularly those with multimorbid conditions, literacy must extend to understanding how predictive AI tools inform care, what data are being collected, and how such data can be used ethically to improve outcomes. Health literacy campaigns, delivered through local languages and culturally relevant media, will play a decisive role in bridging the gap between technological innovation and real-world utility.

Looking forward, ethical AI development tailored for South Asia is a necessity. Predictive models must be trained on local data that reflect the region's unique demographic, genetic, and cultural diversity. Relying solely on datasets from high-income countries risks producing algorithms that fail to capture the epidemiological realities of South Asian populations. Investment in regional research consortia, supported by governments and international organizations, will be critical in creating datasets that are representative and inclusive. Equally important is the creation of governance frameworks that mandate transparency, fairness, and accountability in algorithm design and deployment, ensuring that AI does not reinforce existing inequities in access to care.

Moreover, financing models for sustainable innovation must be explored. South Asia cannot rely exclusively on donor funding or ad hoc pilot projects if it is to build integrated health systems that endure. Instead, governments must consider innovative financing mechanisms—such as public-private partnerships, insurance-based reimbursement for AI tools, and subsidies for rural deployments—that ensure predictive health systems are not confined to elite urban hospitals. Financial inclusion, particularly for marginalized groups, will determine whether technological solutions truly enhance equity or inadvertently widen disparities.

Finally, regional cooperation represents a critical pathway for progress. Health challenges in South Asia, from problematic childhood digital behaviors to chronic disease burdens, transcend national borders. Collaborative frameworks that enable shared data infrastructures, harmonized policies on digital health, and cross-border research partnerships could accelerate innovation while reducing duplication of efforts. Regional platforms such as the South Asian Association for Regional Cooperation (SAARC) or specialized health alliances could play a pivotal role in coordinating these initiatives, ensuring that progress in one country benefits the region as a whole.

In essence, the future of integrated health systems in South Asia rests on a vision that is both technologically ambitious and socially inclusive. By embedding AI in everyday health systems, addressing digital risks from childhood, and managing the rising tide of multimorbidity, the region has the potential to transform its public health landscape. Yet this transformation will only be realized if guided by principles of equity, cultural sensitivity, and sustainability, ensuring that technological innovation serves not as a privilege for a few, but as a foundation for healthier societies across South Asia.

8. Conclusions

The health trajectory of South Asia is being reshaped by the combined influence of digital lifestyles, artificial intelligence, and the growing burden of multimorbidity. From the earliest stages of childhood, digital habits such as problematic smartphone use are leaving lasting impressions on cognitive and behavioral development, raising the prospect of long-term health consequences that extend far beyond the family setting. At the other end of the spectrum, the rise of AI in healthcare offers transformative potential to predict cancer recurrence, monitor patient survival rates, and improve clinical decision-making, but its promise must be balanced by the realities of under-

resourced health systems. Meanwhile, the COVID-19 pandemic has underscored the deadly impact of multimorbidity, particularly for patients with conditions such as diabetes, where mortality risks in critical care settings were amplified by systemic vulnerabilities.

Taken together, these findings highlight the urgent need for a new model of public health in South Asia—one that acknowledges the interconnectedness of early digital behaviors, predictive technologies, and chronic disease management. Building such a model requires moving beyond fragmented interventions toward integrated health systems that are preventive, predictive, and personalized. Policies must not only regulate and guide children's digital engagement but also create pathways for AI to enhance everyday healthcare at the community level. Multimorbidity management, supported by biomarker-driven diagnostics and AI-enabled prognostics, must become a cornerstone of future healthcare delivery.

The pathway forward demands collaboration, equity, and cultural sensitivity. Families, schools, health providers, and governments must coordinate efforts to shape healthier digital environments for children. Regional health systems must invest in building locally relevant AI datasets and governance structures that ensure fairness and accountability. Multimorbidity care must be reframed as a public health priority rather than a secondary concern, particularly in the face of demographic and epidemiological transitions across the region. Importantly, financing models and regional cooperation will be key to ensuring that innovation does not remain confined to urban centers but reaches rural and marginalized populations who bear a disproportionate share of health burdens.

In conclusion, the convergence of digital childhoods, AI in predictive healthcare, and multimorbidity research represents both a challenge and an opportunity for South Asia. If managed in silos, these issues risk deepening existing inequities and straining already fragile systems. But if approached holistically, they offer the chance to build resilient, future-ready health systems that can anticipate risks, intervene early, and deliver equitable outcomes. By embracing integration, ethical innovation, and shared responsibility, South Asia can position itself not only to address today's challenges but also to redefine the possibilities of public health in the 21st century.

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