Chapter 11
Equity-Driven Solutions: Harnessing IoT Technology to Mitigate Health Risks and Bridge Gaps in E-Waste Management

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ABSTRACT

This chapter delves into the global e-waste challenge, emphasizing health risks and equity issues. Positioned within the book's theme, it justifies the relevance of IoT-driven solutions for addressing e-waste's social impacts. The discussion navigates through health risks and disparities in developing nations. IoT-enabled e-waste monitoring is explored, detailing how sensors create real-time databases for precise tracking. Analysis of IoT data assesses health risks, identifies contamination hotspots, and facilitates equitable resource allocation. The chapter highlights IoT's role in tailored awareness campaigns, particularly for underserved populations, and underscores its impact on policy development and enforcement. The conclusion summarizes vital insights, emphasizing the imperative of awareness, regulation, responsible recycling, and global collaboration in tackling e-waste's societal repercussions. This chapter serves as a crucial resource for policymakers, practitioners, and researchers engaged in the effective management of e-waste's social consequences.

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1. INTRODUCTION

1.1 Background and Rationale

The exponential growth of electronic waste (e-waste) has emerged as a pressing global concern, driven by the rapid pace of technological advancement and shorter product lifecycles (Smith, 2018). The improper disposal of electronic devices contributes to environmental pollution and poses significant health risks to both human and ecological systems (Jones & Brown, 2020). As electronic devices become increasingly integral to modern life, the need for sustainable e-waste management strategies becomes paramount.

The rationale behind exploring equity-driven solutions lies in the disproportionate impact of e-waste on marginalized communities. E-waste management often involves hazardous materials, leading to adverse health effects in communities residing near disposal sites (Gupta et al., 2019). Additionally, the global e-waste trade disproportionately affects developing nations, exacerbating existing social and economic inequities (Lee & Williams, 2021). This chapter aims to explore how leveraging Internet of Things (IoT) technology can not only mitigate health risks associated with e-waste but also address the equity issues embedded in its management (Suresh Babu. C.V. 2023)

1.2 The Dual Threat of E-Waste: Health Risks and Equity Issues

E-waste contains hazardous substances such as lead, mercury, and cadmium, posing serious health risks when not handled properly (WHO, 2020). Informal recycling processes, prevalent in many developing regions, further exacerbate these risks. The dual threat arises from the interconnected issues of health hazards and social inequities. Vulnerable populations, often lacking access to proper healthcare and living in proximity to e-waste disposal sites, bear the brunt of these challenges.

Understanding and addressing the equity issues associated with e-waste management requires a multi-faceted approach. This involves not only enhancing recycling infrastructure but also ensuring that the benefits of such initiatives are equitably distributed. IoT technology provides a unique opportunity to create inclusive and accessible solutions, fostering a more equitable distribution of the benefits of e-waste management.

1.3 Scope and Structure of the Chapter

The scope of this chapter encompasses a comprehensive exploration of the role of IoT technology in mitigating health risks associated with e-waste and addressing equity issues in its management. The following sections will explore into specific aspects:

- **Section 2: IoT Applications in E-waste Management:** This section will provide an overview of how IoT technology can be applied throughout the e-waste management lifecycle, from collection to recycling, highlighting it's potential to enhance efficiency and reduce health risks.
- **Section 3: Equity-Driven Approaches:** Here, the focus will shift to strategies that prioritize equity in e-waste management. This includes considerations for marginalized communities, fair distribution of economic benefits, and the role of policy frameworks in ensuring inclusivity.