

Original Article

Essential Drugs Accessibility and its Impact on Elderly Population: A Mixed Method Study in BiharMd Akbar Hussain¹, N. Ravichandran², Jahangir Khan³ and Jwaad Akhtar Khan^{3*}¹PhD Scholar, Department of Healthcare and Pharmaceutical Management, Jamia Hamdard University, New Delhi, India²Professor, Department of Healthcare and Pharmaceutical Management, Jamia Hamdard University, New Delhi, India³Assistant Professor, Department of Healthcare and Pharmaceutical Management, Jamia Hamdard University, New Delhi, India

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ABSTRACT

The availability of essential drugs is a very important factor for sustaining the health and well-being of the population, particularly the elderly, who are often burdened with chronic and age-related illnesses. In Bihar, one of India's most populous and resource-constrained states, the health supply chain faces significant challenges that lead to frequent unavailability of essential drugs. This paper examines the impact of supply chain inefficiencies on the elderly population, highlighting underlying factors such as unavailability/stockouts of essential drugs related to the elderly population in Bihar. By analyzing data and case studies, this study proposes actionable solutions to improve the healthcare supply chain commodities, ensuring equitable availability of essential medicines for the elderly residents of Bihar.

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Introduction

The elderly population of India is growing rapidly, with an estimated 138 million individuals aged ≥ 60 years and as of 2021. Bihar, a state with over 100 million residents, has a significant share of this aging population. Elderly individuals are disproportionately affected by non-communicable diseases (NCDs), such as diabetes, hypertension, arthritis, and cardiovascular conditions, which require regular access to essential medicines. However, the health supply chain in Bihar faces challenges, leading to shortages and stockouts of essential drugs required for the elderly population, resulting in out-of-pocket expenses and financial burdens. This study explores the impact of these

challenges on the elderly in Bihar, identifies the underlying causes of supply chain inefficiencies, and provides recommendations to address these issues.

Background and Rationale

The proficiency and effectiveness of the Public Health system depend on how it ensures the uninterrupted supply of essential medicines in government health facilities, which is one of the key parameters of an effective public health system. India is one of the countries having the highest out-of-pocket (OOP) healthcare expenses. The expenditure for buying medicines constitutes over 67% of out-of-pocket expenses on health in India. (NSSO 68th Round 2011-12). Essential medicines are defined by the WHO (World Health Organization) as those that satisfy the healthcare requirements of the people. They are supposed to always be available in adequate quantities and at affordable costs. For the elderly, access to these

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medicines is critical for managing chronic illnesses, reducing morbidity, and improving the quality of life.

Objectives and Scope of the study

This study aims to examine the supply chain management (SCM) of the public health system and the percentage availability of essential drugs in Bihar. Additionally, to analyze the SCM and the percentage availability of essential drugs specifically for the elderly population within the districts of Bihar. Furthermore, the research intends to investigate the impact of minimum stock levels and stockouts of common essential drugs on the elderly population in Bihar.

Literature Review

Studies have shown that poor availability of essential drugs, especially in the public health system, is a key obstacle to accessing health (Cameron, 2011). The study “Availability of medicines in public sector health facilities of two North Indian States” (Haryana and Punjab), Prinja et al. *BMC Pharmacology and Toxicology* (2015) concluded that robust IT systems should be used for scientific tools and techniques, inventory management, and real-time data for decision-making. In another study, “Improving Availability and Accessibility of Medicines: A Tool for Increasing Healthcare Coverage”, S Sharma - 2015 also concluded that an efficient healthcare supply chain management system ensures uninterrupted supplies of essential drugs in the public health sector. Another study, “Understanding public drug procurement in India: a comparative qualitative study of five Indian states” (Tamil Nadu, Kerala, Odisha, Punjab, and Maharashtra), Singh PV, Tatambhotla A, Kalvakuntla R, M. Chokshi, et al. *BMJ Open* (2013) asserts that critical success factors define the effectiveness of any public procurement system. Another study,

“Comparison of 22nd WHO Model list of essential medicines with explicit criteria for the treatment of chronicity in elderly patients” by Fernandez et al., 2023. This provides an idea of the medicines used by elderly patients. An inventory model that can solve supply chain problems in logistics operations in the Public Health System would be an interesting issue to discuss.

Methodology

This study uses a mixed-methods approach that combines observations with qualitative and quantitative data.

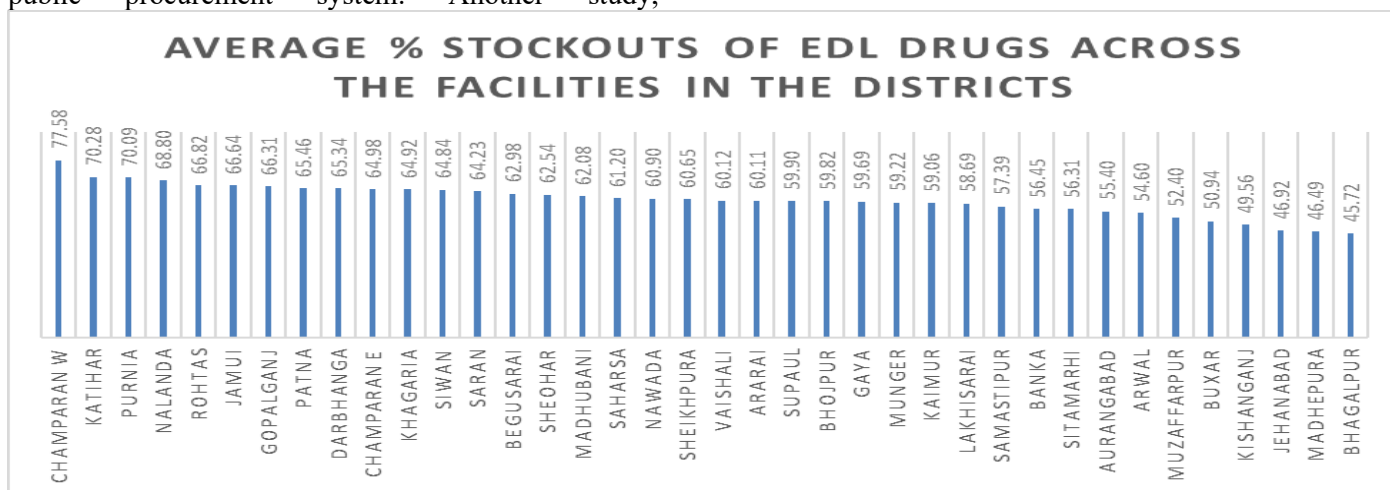
Data Analysis: Review of government reports, health surveys, and essential drugs (EDL 2018). Stockout data from e-Aushadhi/DVDMS.

Stakeholder Interviews: Insights from healthcare providers, policymakers, and supply chain professionals.

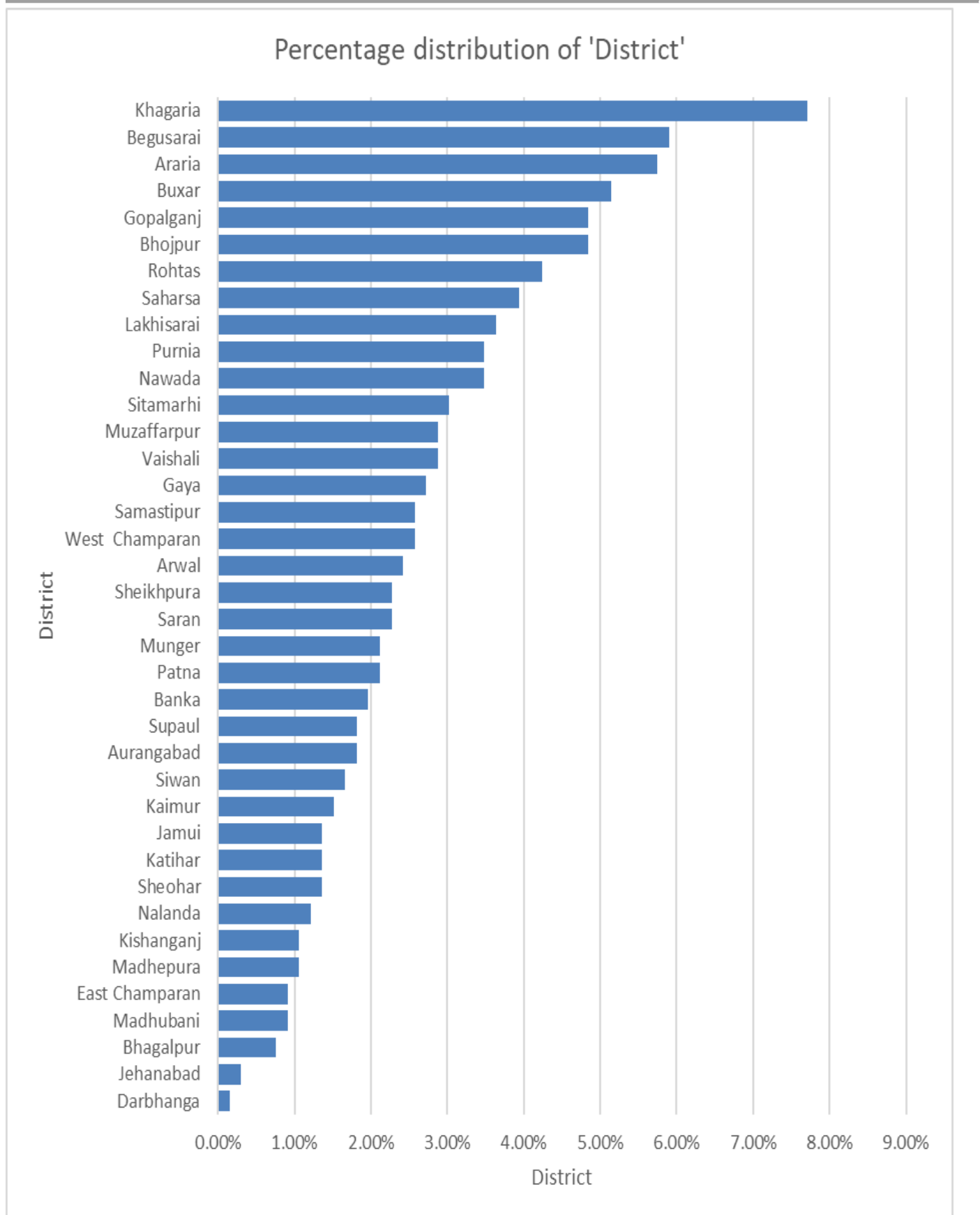
Case Studies: Checked specific instances of drug shortages in Bihar.

Chronic Illness Management in Rural Bihar in a village in the Gaya district, elderly patients with diabetes and hypertension reported traveling over 20 km to access medicines due to frequent stockouts at the local health Centres. This led to increased financial burden, with families spending an average of INR 1,800 per month on private pharmacy purchases. The lack of cold-chain facilities further limits access to insulin and other temperature-sensitive drugs. Impact of Infrastructure Gaps in Supply Chain in Muzaffarpur, a public hospital, caused disruptions in medicine supply due to transportation delays during the monsoon season. Patients, predominantly elderly individuals, were forced to wait weeks for essential cardiovascular drugs.

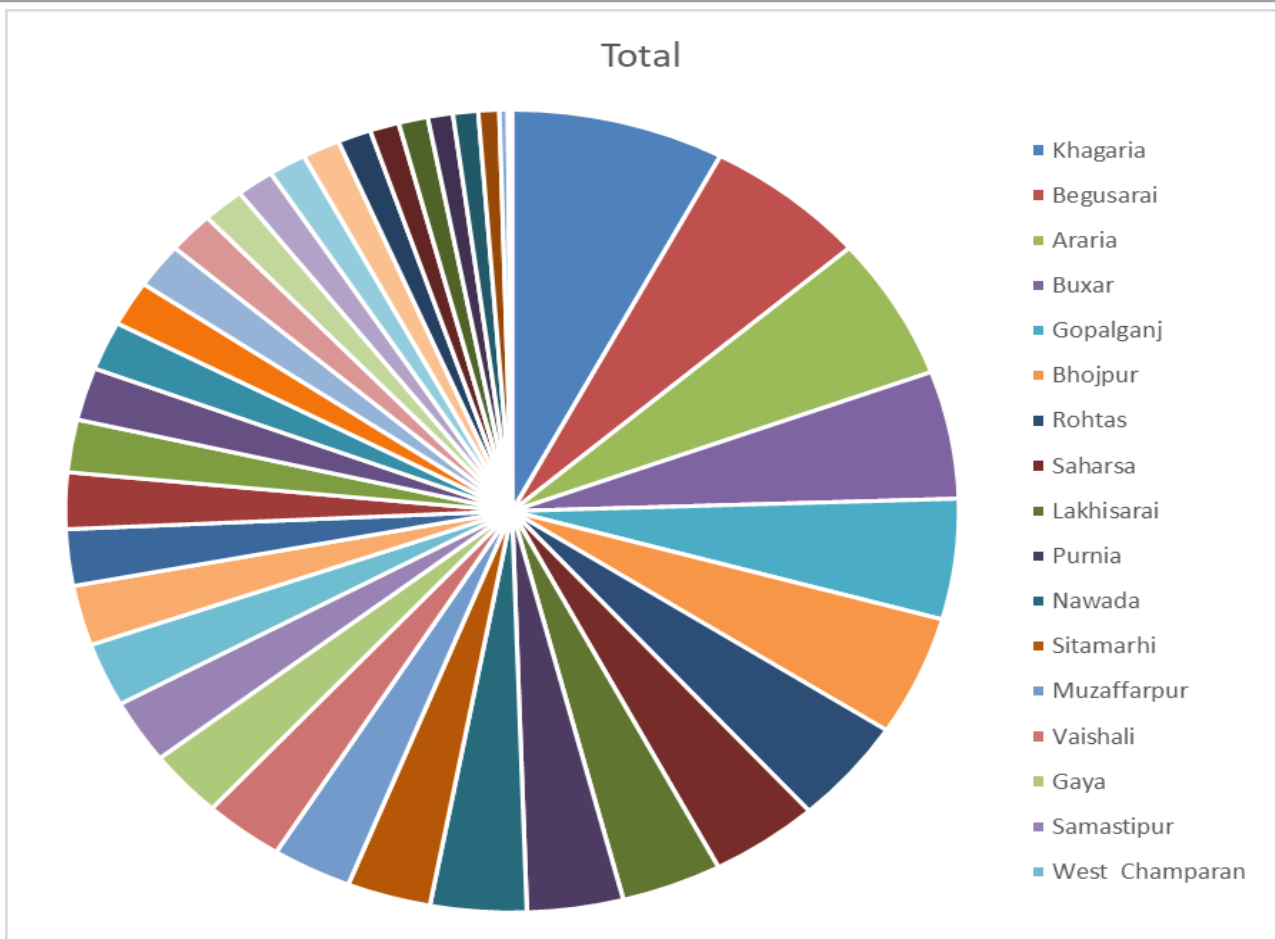
Analysis



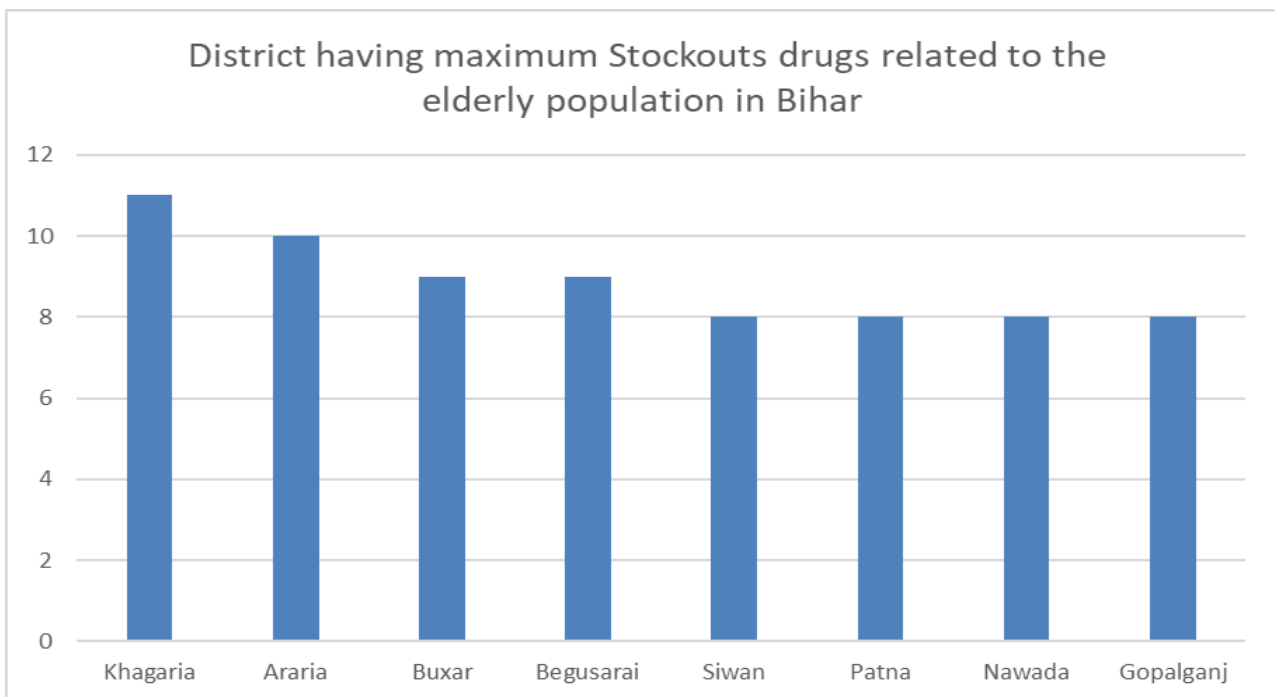
Graph 1: District-wise average % Stockouts of Essential Drugs across the facilities in Bihar with reference to the EDL 2018.



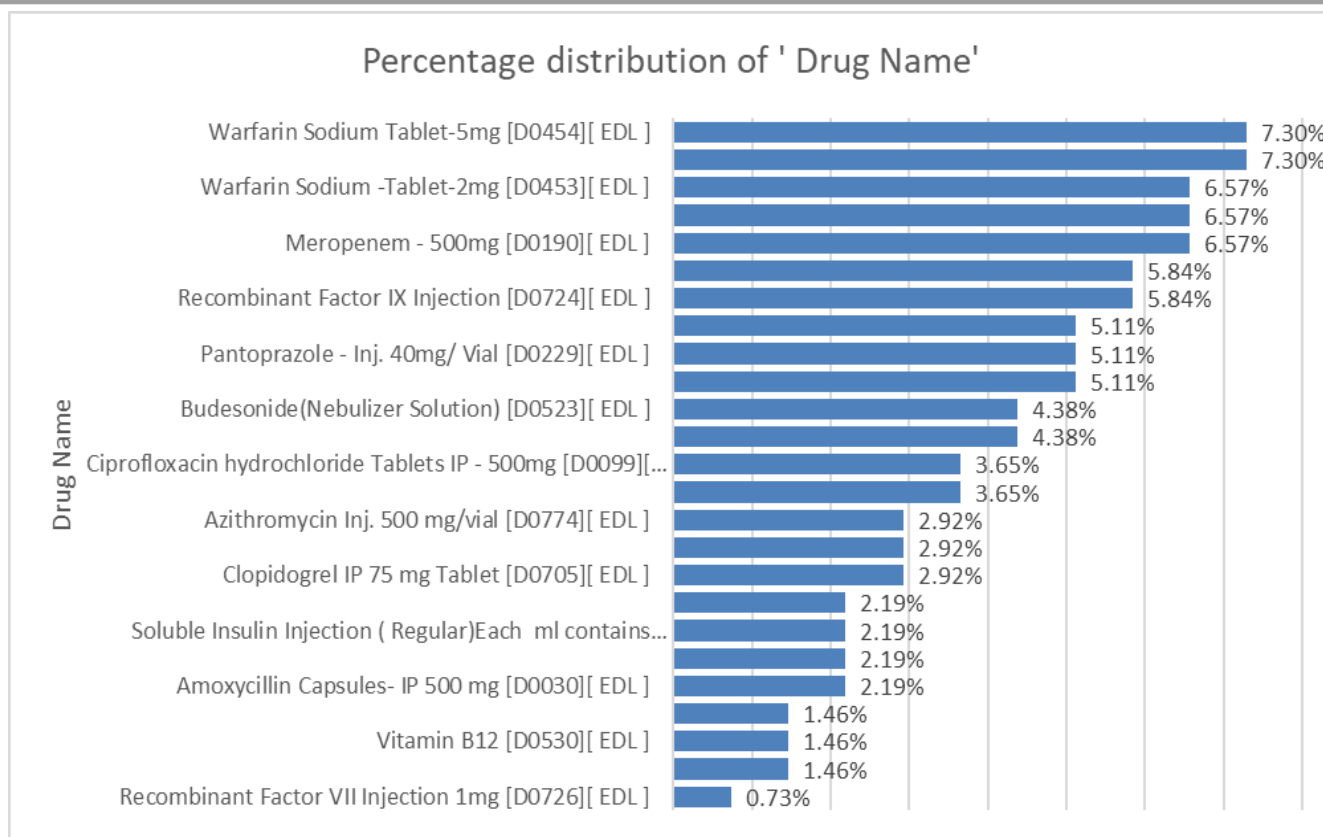
Graph 2: Bar Chart- Stockouts of Essential Drugs (Chemical Composition /Salt) in the district warehouses in Bihar with reference to the EDL 2018.



Graph 3: Pie- Chart - Stockouts of Essential Drugs (Chemical Composition /Salt) in the district warehouses in Bihar with reference to the EDL 2018.



Graph 4: District having maximum Stockouts of Essential Drugs related to the elderly population.



Graph 5: Distribution of Essential Drugs in Bihar related to the elderly population.

Findings

District-wise Average % Stockouts of essential drugs across the facilities in Bihar

Bhagalpur district was found to have the lowest average % stockouts (45.72%) of essential medicines across the health facilities during FY 2022-23 compared to the other districts in Bihar.

It reflected relatively better supply chain management of essential medicines, the highest average % of essential drugs availability (54.28%) across the public health facilities in the Bhagalpur district.

West Champaran district was found to have the highest average % stockouts (77.58 %) of essential drugs across the health facilities during FY 2022-23, compared to the other districts in Bihar, reflecting the poor health supply chain management system for essential medicines and the lowest average % of essential drugs availability (22.42%) only.

Impact on the Elderly Population

There is no list of essential drugs exclusively for the elderly by the WHO or MoHFW; however, there are many common medications that the older population requires. Out of the appendices list, 13 essential drugs were found to have significant stockouts and were

chosen from the stockouts lists during FY 202-23, which are common to the elderly population.

District Khagaria had found highest stockouts of the selected drugs for the elderly population, followed by the districts Araria, Buxar, Begusarai, Siwan, Patna, Nawada, and Gopalganj from January to March 2023.

An anti-coagulant drug named Warfarin Sodium 5mg tab was found highest stockouts in terms of the district as well as duration (Jan – March 2023), followed by Warfarin Tab 2mg, Inj. Meropenem 500 mg (Antibiotic), Inj. Pantoprazole 40mg, Budesonide Nebulizer Solution, Ciprofloxacin 500 mg Tab, Clopidogrel 75 mg tab, Soluble Insulin Inj., Amoxicillin 500 mg Cap.

Discussion

Health Outcomes

The unavailability of essential medicines results in complications, hospitalizations, and higher mortality rates among the elderly population.

Economic Burden

The stockouts of essential drugs are directly proportional to out-of-pocket expenses (OOPE). Frequent stockouts force the elderly and their families

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to seek medicines from private pharmacies at higher costs, increasing out-of-pocket expenditure (OOPE). In this study, we interpreted that the elderly population of district Khagaria would have the highest OOPE.

Psychosocial Impact

The inability to access the required medications contributes to anxiety, stress, and decreases quality of life in the elderly population.

Conclusion

Health supply chain management in Bihar faces significant challenges that impact the availability of essential drugs required by the elderly population. Dealing with these challenges requires a multifaceted approach that involves infrastructure development, technological developments, and community participation. Ensuring the reliable availability of essential drugs is not only a healthcare imperative but also a social responsibility for supporting the dignity, health, and well-being of the elderly population. Moreover, Population aging has lasting effects on sustainable development. Sustainable Development Goal 3 focuses on well-being for all at all ages and thus also addresses aging. India is committed to SDGs and has progressively streamlined global indicators into national development indicators. However, Bihar needs to improve its health and well-being indicators so that India can achieve its required goals.

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None.

Conflict of Interest

None.

Author Contributions

All the authors contributed to the study.

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Appendix

List of Essential Medicines commonly used by the Elderly Population: There is no list of essential drugs exclusively for the elderly by WHO/MoHFW; however, there are many common medications that the older population requires. The following medicines are considered essential for managing common chronic and age-related conditions in the elderly population:

- Cardiovascular diseases/antihypertensive: atenolol, amlodipine, losartan, digoxin, and lisinopril.
- Diabetes / Antihyperglycemic: Metformin, Glibenclamide, Insulin (Regular and NPH).
- Pain and Arthritis: Paracetamol, Ibuprofen, Diclofenac, Tramadol.
- Respiratory Conditions: Salbutamol Inhaler, Budesonide Inhaler, Montelukast.
- Neurological Disorders: Gabapentin, Amitriptyline, Levodopa-Carbidopa.
- Antibiotics: Amoxicillin, Ciprofloxacin, Azithromycin.
- Anticoagulants: Warfarin, Aspirin.
- Diuretics: Furosemide
- Anti-cholesterol: Atorvastatin and Simvastatin
- Others: Multivitamins, Calcium and Vitamin D supplements, and Folic Acid.