CHAPTER 2

LITERATURE REVIEW

The literature survey aims to provide a comprehensive understanding of the gaps related to financial implications in healthcare, including out-of-pocket expenditures (OOPE), socioeconomic status, health policy challenges, and public drug procurement, with a particular emphasis on medicines. The literature review is organized into the following four sections:

- Government efforts in reducing the burden of medicine OOPE
- Burden of OOPE on Infectious Diseases such as Tuberculosis
- Burden of OOPE among Pregnant Women
- Public Drug Procurement and Distribution

2.1 Government Efforts in Reducing the Burden of Medicine OOPE

1. **Joe (2015)** evaluated the distressed healthcare financing system in India that involved OOPE for medical services, which were often supported by loans, selling of assets, or financial assistance from friends and family. According to the study, over 60% of hospitalization cases in rural areas and 40% in urban areas depend on this type of funding, with marginalized populations particularly women, the elderly, and lower socioeconomic classes being the most impacted. Non-communicable diseases, especially cancer, heighten the likelihood of financial strain, with notable gender disparities in borrowing practices. To lessen these financial pressures, the study recommends better healthcare coverage and social protection laws (Joe, 2015).

2. **Eun-Ja Park et al., (2015)** performed a study in Korea to compare the OOPE burden on elderly and nonelderly patients suffering from chronic health problems. They concluded that in comparison to nonelderly patients, the elderly had higher OOP drug

expenses and were more liable to the impact of such expenditures. They recommended that such payment policies should be implemented for medicinal products that consider the economic status of elderly patients (Park et al., 2015).

3. **Wagstaff et al., (2019)** examined the OOPE in 146 countries from all World Bank income groups, assessing their distribution, relationships with macroeconomic and health system variables, and effects on income and consumption. They concluded that OOPE was progressive for the rich when measured in relation to consumption and it was regressive for the poor when measured in relation to income (Wagstaff et al., 2020).

4. **Bijlmakers et al., (2019)** performed a cross-sectional study in Malawi to fulfill a surgical need by OOPE and catastrophic household expenditures. They concluded that OPP household expenses for necessary surgery were significant and frequently catastrophic, putting households particularly those that were already needy at risk of falling into even greater poverty. The essential expansion of surgical services in rural Malawi must be accompanied by financial risk prevention measures. Financial risk prevention must be taken to roll out this issue special for poor patients (Bijlmakers et al., 2019).

5. **Ozieh et al., (2019)** performed a study to examine the trends of increased OOPE burden on kidney disease patients in the USA. They surveyed between 2002-2011 and selected kidney patients above 17 years with OOP burden. The participants were insured and uninsured with low, medium, and high economic status. Their findings revealed that economically sound ensured patients were not bothered about OOPE burden but uninsured and economically poor individuals with kidney disease remained vulnerable. So, the vulnerability of kidney disease patients with high OOPE should be taken into consideration during policymaking and implementation (Ozieh et al., 2019).

6. **Iragorri et al., (2021)** conducted a systematic review to evaluate the OOPE burden on cancer patients and their caretakers. They reported that the monthly expenses for cancer treatment in the United States ranged from USD 180 to USD 2600, while those in Canada, Western Europe, and Australia were lower. Further, in high-income countries, cancer-related costs were 16% of annual income, but in low and middle-income countries, it was around 42%. The study emphasized the necessity of better healthcare coverage to reduce financial burden and guarantee equitable access to medical facilities for cancer treatment or management (Iragorri et al., 2021).

7. **Bedado et al., (2022)** conducted a cross-sectional study on patients who visited govt hospital, in East Shoa Zone, Ethiopia. The finding explored that a significant number of patients (332 respondents out of 378 - 87.8%) were paid OOPE for healthcare expenditures. Age of the respondents with education status, average monthly income, family size, and living status, were associated with the OOPE. The study emphasized the necessity of stakeholder and governmental measures, such as Social Health Insurance and Urban CBHI, to lessen financial constraints and guarantee fair access to healthcare (Bedado et al., 2022).

8. **Sangar et al., (2022)** utilized the data from a survey conducted by "The National Sample Survey Organization (NSSO)" in 2014, They analyzed the economic cost of OOP health expenditure in India. Their findings showed that OOP expenditure disproportionately affects lower-income populations for outpatient care, resulting in 8% of the population living below the poverty line. Vulnerable populations such as Muslims, scheduled castes, rural dwellers, and agricultural laborers are the most impacted, highlighting the necessity for India to alter its financing strategy for healthcare (Sangar et al., 2022).

9. **Mekuria et al., (2023)** evaluated the financial stress of OOPE on medicine in Ethiopia. The study stated that a large amount of healthcare costs in Ethiopia are incurred through OOPE for medications. A study of national household surveys revealed that while the proportion of households experiencing catastrophic medical payments declined marginally (1.0% - 0.73%) from 2010 to 2016, the total number of individuals impacted increased. OOP payments for medicine resulted in poverty for more than 11,000 households in 2015/16. Economic status, geographical location, and the nature of health services were significant determinants of these disparities. The study advocates for enhancements in the supply of medicine within public facilities and the establishment of risk protection mechanisms, particularly concerning inpatient care (Mekuria & Ali, 2023).

10. **Islam et al., (2024)** reported the impact of medical treatment loans on health care utilization and OOPE. This study was conducted through a randomized controlled trial in 24 microfinance branches in northern Bangladesh. Their findings revealed that excluding the loaned amount did not affect the overall increase in OOPE (Nazmul Islam et al., 2024) .

11. **Garcia-Diaz et al., (2024)** conducted a study in three African (Malawi, Tanzania, and Uganda) countries on the persistence of catastrophic OOPE. They demonstrated how the vulnerability of specific groups to persistent catastrophic OOPE, particularly those who lived in rural areas, had less education, were elderly, or had experienced hospitalizations (Garcia-Diaz et al., 2024) .

12. **Wuraola et al., (2024)** performed a prospective study on the OOPE of breast cancer. The study examined both direct and indirect OOPE associated with breast cancer treatment in a singular tertiary care facility in South West Nigeria. They concluded

around 70 % of sufferers at care facilities encounter catastrophic health expenditures due to OOPE related to obtaining care (Wuraola et al., 2024).

13. **Kaladharan et al., (2024)** studied how the OOPE of emerging nations was affected by variables like Gross Domestic Product (GDP), Domestic General Government Health Expenditure (DGGHE), government health schemes, and different health financing programs. The analysis indicated that government schemes and health insurance programs decrease OOPE, whereas DGGHE and GDP contribute to their rise. The research demonstrated the necessity of minimizing OOPE to attain universal health coverage, advocating for a comprehensive strategy that encompasses preventive care, extensive insurance, robust public health systems, and strict regulation of pharmaceutical pricing (Kaladharan & Manayath, 2024).

14. **Archana Sawshilya (2020)** identified several challenges in the implementation of the Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) arising from the pharmaceutical industry. Key issues include pharmaceutical companies' reluctance to support generics due to fears of market share loss, corruption among officials, and dependency on Central Public Sector Undertakings (CPSUs) which struggle to meet demand. Additionally, bureaucratic hurdles impede the opening of new stores and lead to frequent unavailability of essential medicines, driving patients towards branded alternatives. Marketing practices targeting medical practitioners also hinder the acceptance of generics, while delays in payment processing from the Bureau of Pharma PSUs of India (BPPI) affect the operational viability of manufacturers. These factors collectively create significant barriers to achieving PMBJP’s objectives (Archana Sawshilya, 2020).

15. **Tekulapally et al., (2024)** conducted a cross-sectional study on the awareness, attitude, and usage of generic medicines among prescribers and patients at a tertiary care

teaching hospital. It was found that while all prescribers knew of "generic medicines," only 56% could define them accurately. Awareness among patients was even lower, with just 36% having heard of generics and only 27% understanding their definition. Despite 87% of prescribers and 54% of patients agreeing that generics reduce therapy costs, trust issues persist, with 46% of prescribers and 33% of patients preferring branded medicines. Additionally, 41% of patients doubted the quality of generics due to their lower prices. These findings highlight the need for educational efforts to build trust and dispel misconceptions about the efficacy and safety of generics, particularly those offered by initiatives like the Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) (Tekulapally et al., 2024).

2.2 Burden of OOPE on Infectious Diseases such as Tuberculosis

16. **Tanimura et al., (2014)** conducted a systematic review to evaluate the reasons for the financial burden. They suggested some strategies against the economic burden of tuberculosis in low and middle-income countries. Poorly and MDR patients were the major sufferers with expenses accounting for 58% of an individual's and 39% of a household's yearly income. To face the economic burden, patients took loans and sold their household assets. In addition to ensuring equitable financing and delivery of healthcare services that minimize both direct and indirect costs, it is essential to provide TB patients and their families with adequate income substitution and other social safeguards (Tanimura et al., 2014).

17. **Muniyandi et al., (2019)** conducted a study to evaluate India’s new strategy for ensuring that no family would be affected by TB up to 2020 due to the catastrophic costs. The study assessed the variables of catastrophic health expenditures, proposed solutions for alleviating these costs for families impacted by tuberculosis, and examined

the strategies and interventions implemented by health programs to alleviate/mitigate these expenses (Muniyandi & Ramachandran, 2019).

18. **Reuter et al., (2020)** reported that around 20 billion children are exposed to TB every year underscoring a significant global paediatric health crisis. They evaluated challenges associated with the TB burden and strategies to solve these challenges. This study, with particular attention on identifying children who were already exposed, detecting the severity of infections, evaluating disease risk, treating patients, and encouraging stakeholder collaboration to eradicate TB (Reuter et al., 2020) .

19. **Chadha et al., (2022**) researched to examine the lag time for new TB patients who were registered at Bengaluru's public health facilities to start anti-TB therapy (ATT) due to lack of OOPE and delayed appearance of symptoms. About 228 sufferers about delay and cost appeared in the interview before ATT. Results suggested that patients initially sought care at private clinics but received diagnoses and treatment in public facilities after an average delay of 68 days. On average, patients incurred costs of $402, with increased expenses associated with extra-pulmonary tuberculosis and extended delays. Approximately 20% experienced significant financial distress, with numerous individuals resorting to borrowing funds or liquidating assets. It is essential to implement measures that minimize delays, costs, and financial burdens on poor patients (Chadha et al., 2022) .

20. **Bashir et al., (2022)** conducted a study to evaluate the capability of newly established tuberculosis labs to prevent or manage the TB. They reported that India's National Tuberculosis Elimination Program (NTEP) collaborated with FIND India to enhance tuberculosis testing through the establishment of 61 laboratories, significantly augmenting testing capacity. This study showed that these laboratories exhibit 69%

efficiency and are projected to manage significantly increased testing capacity by 2025, thereby supporting India's objective to eradicate tuberculosis (Bashir et al., 2022).

21. **Ryckman et al., (2023)** conducted a study to evaluate the cost-effectiveness of TB prevention therapy (TPT) for household contacts and individuals living with HIV/AIDS (PLWHA) in 29 incidence countries. TPT was highly suggested for people living with HIV/AIDS and young children in households; however, it was a little bit expensive. The study utilized a model to demonstrate that TPT was cost-effective in reducing TB cases and mortality, particularly among young children, and continues to provide benefits across all age groups. The implementation of TPT has the potential to substantially decrease morbidity and mortality, rendering it a valuable investment despite associated costs (Ryckman et al., 2023).

22. **Kumar et al., (2023)** examined the pricing service in "northern India public health facilities under the National Tuberculosis Elimination Program (NTEP)". Results indicate that the average cost of delivering NTEP services was greater at CHCs (US$ 5243.1) compared to PHCs (US$ 1031.9). At CHCs, the majority of the cost (80%) was due to outpatient, diagnostic, and treatment while in the case of PHCs, the major cost was due to outpatient, monitoring, and meeting and training services. Human resource expenses were the main factor influencing the cost per treated TB patient, which was US$182.5 at CHCs and US$101.4 at PHCs (Kumar & Prinja, 2023) .

23. **Chadhar et al., (2023)** studied the impact of the Nikshay Poshan Yojana on TB sufferers. A cross-sectional study was conducted in India at the Ballabgarh (WB) tuberculosis unit for 6 months with 146 patients. The mean expenditure for TB-related services was Rs 30,046, with numerous households encountering significant financial burdens. Despite the Nikshay Poshan Yojana, A majority of patients managed their financial burdens by obtaining loans (30.8%) or selling their assets (9.6%). Despite the

existence of universal health coverage, tuberculosis patients continue to encounter significant financial burdens, indicating a need for enhanced financial support and improved healthcare services (Chadhar et al., 2023).

24. **Assefa et al., (2024)** reported a systematic review of patients' financial burden for the diagnosis and treatment of TB. This systematic review was conducted for Ethiopia, which offered a free TB diagnosis and treatment but still 50 % of patients have to pay catastrophic costs, particularly during the pre-diagnostic and intense treatment phases. The major reason for the cost enhancement might be MDR-TB, co-infection like TB-HIV, and residency in rural areas. The authors recommended some strategies to reduce the financial burden *viz* "by community-based therapy, active case-finding, digital adherence tools, and improved insurance coverage" (Assefa et al., 2024)**.**

25. **Santos et al., (2024)** examined the health and socioeconomic features linked to poor treatment results for TB-affected children and adolescents in Brazil. The study was conducted on 88,270 patients (children, 0-9 years and adolescents, 10-17 years) retrospectively in "Brazil notified to the national *Sistema de Informação de Agravos de Notificação (Sinan)* from Jan 1, 2001, to Dec 31, 2022". Out of the 88,270 patients, 30.6 % were under direct observation therapy (DOT) and got favourable treatment outcomes. Unfavourable treatment outcomes were observed in patients with co-infections like TB-HIV who did not receive the DOT. To reduce the mortality of such patients, Govt helped the sufferers with cash transfers. Even though Brazil's TB treatment success rates are within WHO standards, this study suggested some strategies like improved DOT, integrated HIV-TB treatments, and holistic care to address inequities in vulnerable populations (Santos et al., 2024) .

26. **Yadav et al., (2024)** conducted a study to evaluate the OOPE faced by Indian TB patients. Despite a well-developed DOTS program for TB patients in India, a significant

number of households experience economic difficulties and face challenges by borrowing funds or selling their existing assets. This burden was greatly influenced by variables such as hospitalization length, lack/availability of proper facilities at the proper time, less income, and education. In addition to proposing hardship financing as an alternate metric to evaluate the efficacy of TB control initiatives, the report recommends re-examining the coverage of subsidies for TB treatment (Yadav et al., 2019).

27. **Dutta et al., (2024)** examined the significant financial burden accompanying TB treatment and its impact on patients and their families. The study revealed that numerous patients incur significant expenses for treatment, leading to financial difficulties for some families. Many patients resorted to taking loans or selling livestock to manage their circumstances. The study indicates that despite Universal Health Coverage, tuberculosis patients continue to encounter significant expenses and require supplementary financial assistance and improved healthcare services (Dutta et al., 2024).

28. **Kaurav et al., (2023)** prepared a review manuscript that stated catastrophic costs are a major hurdle in the management of TB. TB, which is frequently associated with poverty, puts a significant financial strain on families, particularly when medical expenses exceed 20% of their yearly income. Just in India, 18% of these catastrophic medical costs are incurred. To solve this, a nationwide cost survey should be carried out to comprehend the financial burden that tuberculosis places on households, pinpoint the main causes of these expenses, and create plans to lower them. Additionally, to increase the efficacy of present therapies, more research and creative approaches are required (Kaurav & Bharti, 2023).

29. **Chopra et al., (2023)** looked at the incidence of pulmonary tuberculosis (PTB) risk factors among homeless people in several parts of Delhi, India. They concluded that because of their high-risk factors and poor living situations, homeless people were more likely to be infected with PTB. The study was performed on 200 homeless individuals for PTB screening. There were 17 of these who were diagnosed with active PTB, meaning that there were 85 instances for every 1000 people. Smoking (41.2%), chewing tobacco (47.1%), drinking alcohol (47.1%), HIV (5.9%), and diabetes (5.9%) were the most common risk factors. PTB was more common among females, yet a greater proportion of males were diagnosed. The high PTB rate among the homeless requires prompt attention, and further study is crucial to substantiate these findings (Chopra et al., 2023).

30. **Prasanna et al (2018)** performed an explanatory mixed-method study to evaluate the Catastrophic costs of tuberculosis care in Puducherry, India. The research sought to evaluate patient expenses associated with diagnosis and treatment, determine the percentage of households experiencing catastrophic costs, and investigate coping mechanisms among newly diagnosed and previously treated tuberculosis patients. TB care costs were $195 on average, with 32.4% of households having catastrophic costs (above 20% of annual income). Patients with HIV or hospitalization had more catastrophic expenditures than normal TB patients. Pledging jewellery and borrowing money were common coping techniques, with cash aid being the most effective (Prasanna et al., 2018).

31. **Lambert et al., (2013**) conducted a study in an urban area of South America, to evaluate the delayed treatment and OOPE for TB. Compared to males, the total delay in treatment was greater for females. Similarly, more delay was observed in private hospitals than in public hospitals. Out-of-pocket expenses for private treatment were

more, amounting to $21.9 compared to $5.4. Interventions targeting healthcare practitioners, particularly physicians, may decrease delays and extraneous costs (Lambert et al., 2005).

2.3 Burden of OOPE among Pregnant Women

32. **Chatterjee et al., (2008)** examined the prevalence of chronic illness among pregnant women and its effects on health spending and treatment availability. A cross-sectional study involving 6,294 women aged 19 - 45 revealed that 27% of pregnant women and 39% of nonpregnant women suffered from chronic disease. Access to care and overall healthcare expenses were comparable for pregnant women with and without chronic illnesses; however, OOPEs were increased for those with chronic ailments without extending the overall cost. Additional research is required to ascertain whether these commonalities endure post-delivery, considering the significant frequency of women with chronic illnesses within the childbearing age demographic (Chatterjee et al., 2008).

33. **Roberts et al., (2014)** studied OOPE and "insurance coverage for abortion in the United States". According to the report, many women in the United States face large out-of-pocket expenses for abortion services, especially for later gestational abortions. Although some individuals have financial support *via* Medicaid, private insurance, or other entities, more than half cited expenses as a reason for postponements in accessing care. Disparities in coverage within public and private insurance persist as a significant concern, disproportionately affecting low-income women (Roberts et al., 2014).

34. **Aikins et al., (2014)** assessed socioeconomic status on the costs incurred by pregnant women for health services in peri-urban Accra, Ghana. It was determined that women in higher income groups incurred greater medical and non-medical expenses, along with increased time and income losses, despite a higher likelihood of possessing health

insurance. The study suggested using community-based activities to raise awareness of health insurance plans and improve education on pregnancy-related healthcare (Aikins et al., 2015).

35. **Wu et al., (2014)** examined the OOPE in fertility. The research analyzed OOPE for reproductive procedures involving 332 couples sourced from many clinics. The median costs for each treatment option varied greatly, ranging from $912 for ovulation induction to $19,234 for IVF. The most expensive procedure was IVF, which cost an average of $15,435 more than IUI. Expenditures were not substantially correlated with pregnancy success, offering essential information for couples to budget for treatment costs (Wu et al., 2014).

36. **Foster et al., (2015)** examined and concluded that permitting OTC access to oral contraceptive pills (OCPs) without a prescription could markedly enhance their utilization among low-income women, especially if the OOPE was minimal or non-existent. This may result in a decrease in unwanted pregnancies (by 7 - 25%) and related public healthcare expenditures, underscoring the prospective public health and economic advantages of OTC access to effective contraception (Foster et al., 2015).

37. **Elliott et al., (2016)** investigated the financial burden and stress of males pursuing reproductive treatment. 64% of the 111 participants had OOPE of more than $15,000, with procedures accounting for the majority of these costs. Those who depended on savings or took on loans were most impacted, with over half reporting financial difficulty. The results underscore the financial difficulties associated with male infertility therapy and their influence on healthcare choices (Elliott et al., 2016).

38. **Kim et al., (2018)** examined the impact of socioeconomic status (SES) on pregnancy results in South Korea, where all expectant mothers get financial assistance for prenatal

care. According to the study, compared to women from higher SE backgrounds (NHI beneficiaries), women from lower SE backgrounds (Medical Aid recipients) were more likely to suffer from “preterm delivery, abortion, Caesarean delivery, preeclampsia, obstetric hemorrhage, and poor prenatal care”. Even with universal access to prenatal care, these unfavourable results raise the possibility of additional obstacles, which call for more research by health authorities (Kim et al., 2018).

39. **Wollum et al., (2020)** studied the effects of OOPE for an OTC progestin-only pill on use in case of unwanted pregnancy in American women. It concludes that eliminating or reducing costs substantially enhances usage, particularly among low-income women, potentially resulting in a decrease in unplanned pregnancies by as much as 8% per year. Cost-effective pricing and insurance coverage were essential for equitable access and mitigating contraceptive disparities (Wollum et al., 2020).

40. **Callander et al., (2021)** by using a big dataset examined how government financing, OOPE, and maternal healthcare services were distributed among socioeconomic categories in Australia. The OOPE for women with better socioeconomic positions were greater ($2,432 vs. $1,026 for “disadvantaged women”), as they sought more private and specialized treatments. Medicare funding predominantly benefited affluent women, whereas public hospital funding was allocated to support disadvantaged women. According to the report, policy changes are necessary to increase underprivileged women's access to and affordability of maternal care (Callander et al., 2021).

41. **Gunarathne et al., (2022)** reported a systematic review on OOPE during pregnancy. The purpose of the study was to thoroughly examine the scope, causes, contributing variables, and consequences of pregnancy-related health-related OOPE (Gunarathne et al., 2022).

42. **Jones et al., (2022)** studied the connection between social factors of health and maternal mortality in the UK. It examined how these variables raise the risk of death during pregnancy, particularly for underprivileged women, and emphasized the difficulties in delivering quality care even in the face of free maternity services. In order to support pregnant women who were at risk and improve maternal outcomes, the study advocates for better data collection, prevention, and intervention (Jones et al., 2022).

43. **Sarmiento et al., (2023)** conducted a study to evaluate the "cost-effectiveness of elective cesarean delivery (ECD) versus spontaneous vaginal delivery (SVD) concerning short-term maternal outcomes in a low-risk obstetrical population in Colombia". For low-risk pregnancies, SVD was more economical and had better short-term mother outcomes than ECD. During a 42-day postpartum interval, SVD was more cost-effective, being $324 less expensive, and provided superior Quality Adjusted Life Years (QALYs). The research underscores the necessity for health policies that advocate for SVD (Sarmiento et al., 2023).

44. **Janaki et al., (2024)** evaluated "socioeconomic determinants affecting maternal health during pregnancy". Socioeconomic variables profoundly influence maternal health, resulting in inequities in healthcare access and outcomes for pregnant women. This investigation underscores disparities influenced by "income, education, employment, and housing", advocating for specific solutions like enhanced healthcare access, educational improvements, job assistance, and governmental reforms to guarantee fair mother care (Janaki & Prabakar, 2024).

2.4 Public Drug Procurement and Distribution

45. **NHSRC New Delhi (2012)**, provided the "Assessment criteria for state drug procurement and distribution system". It provided a total 5 measurable elements

(standards) for the state drug procurement and distribution system in states (National Health Systems Resource Centre, 2012).

46. **Singh et al., (2013)** analyzed drug procurement models across five Indian states *viz* "Tamil Nadu, Kerala, Odisha, Punjab, and Maharashtra" to evaluate their functional efficiencies based on "53 process and price parameters". Data were gathered *via* interviews with key informants and field personnel. The analysis indicated that autonomous procurement organizations demonstrated greater efficiency in payments, drug pricing, and inventory management. The research delineates essential success factors and advocates for additional investigation to enhance policy formulation in this domain (Vikram Singh et al., 2013).

47. **Reghu et al., (2013)** evaluated the drug "procurement and distribution system in Tamil Nadu state of India". In 1994, Tamil Nadu created the Tamil Nadu Medical Service Corporation (TNMSC) was established, which revolutionized public drug procurement. TNMSC has transformed the public medication procurement system with its well-designed and scientifically structured program (Reghu et al., 2013).

48. **Kjos et al., (2016)** analyzed the pharmaceutical system at government hospitals in Vietnam, emphasizing medicine procurement, storage, and delivery. This study employs qualitative methodologies to create a conceptual model that underscores the impact of governmental policies on structure while permitting functional flexibility. Comparing Vietnam's approach to international standards, the findings offer a framework for benchmarking and quality enhancement (Kjos et al., 2016).

49. **Rovers et al., (2017)** researched to examine the role of pharmacists in facilitating access to medication in rural Australia, using a 24-step drug distribution model created through qualitative approaches. Essential elements encompassed supplier selection,

budgeting, and dispensing, with an emphasis on enhancing cold chain integrity. The results endorsed policy, system architecture, and education in remote healthcare (Rovers & Mages, 2017).

50. **Beall et al., (2017)** evaluated "a method for comprehending the generic acquisition of HIV medications by developing nations under patent protection". This research linked "procurement records from the WHO's Global Price Reporting Mechanism to antiretroviral (ARV) patent data derived from a World Intellectual Property Organization patent study". Over fifty percent of generic procurements were aligned with patent protection in either the exporting or importing country, despite the rarity of patents in these areas. The study suggested that developing countries might persist in acquiring generic formulations of essential antiretroviral drugs. The interplay of legal flexibilities, including voluntary license agreements, had likely played a crucial role in improving access to generics. The study suggested further investigation to understand the implications of these findings (Beall & Attaran, 2017).

51. **Dixit et al (2020)** explored the strategy for generic drug distribution in Rajasthan, India, focusing on "supply chain, sourcing, ordering, logistics, inventory management, and information systems". Techniques such as value stream mapping, analytical tools, 5S methodology, and performance measurement systems were examined to formulate plans for enhanced resource utilization (Dixit et al., 2019).

52. **Vledder et al. (2019)** conducted a study in Zambia utilizing a randomized trial involving 439 health facilities across 24 districts. This study was to explain the optimal supply chain configuration for distributing essential medicines within the public sector of low-income nations. The study indicated that a direct distribution system, in which clinics procure medicines directly from a central agency, markedly decreased stockouts relative to conventional multi-tiered systems. This strategy enhances responsibility and

aligns decision-making with staff competencies; however, it may encounter challenges from political and systemic factors, despite its demonstrated effectiveness (Vledder et al., 2019).

53. **Soares et al., (2019)** reported a scoping review related to drug procurement in South American countries. The review identifies deficiencies "concerning the medication procurement processes, specifically in relation to market dynamics, execution duration, supplier information, and types of purchases". Although all nations were analyzed using the WHO/HAI methodology, which enabled data collection on availability and pricing, these elements were little examined. The scoping study offers a comprehensive examination of public medicine procurement, to expand discourse, promote collaborations, and pinpoint knowledge deficiencies in this domain (Soares et al., 2019).

54. **Anggriani et al., (2020)** examined the "impact of pharmaceutical policy reforms on the prices of medicine procurement" in Indonesia. A pre-post observational study was conducted to compare the data from 2013 -2017. The results demonstrated that 79.6% of medications underwent substantial price reductions, with 39% exhibiting decreases greater than 50%. Prices increased for specific patented medications and those with limited brand alternatives. Public and private hospitals demonstrated similar trends in price reductions, including for non-e-catalogue medications; however, the prices of branded generics in private hospitals remained unchanged. The reforms resulted in a significant reduction in medicine procurement costs (Anggriani et al., 2020).

55. **Dubois et al., (2021)** examined the centralized drug procurement (CDS) system in 7 low and middle-income countries. They studied "how CDS influences costs". They examined 3 years data of 40 essential medicines and concluded that the CDS system lowers prices, but less in concentrated supplier marketplaces (Dubois et al., 2021).

56. **Callejas et al., (2021)** analyzed the welfare effects of a public procurement initiative in Ecuador, wherein the government provides cancer treatment medications at no cost, to assist low-income populations. This analysis contrasted a targeting strategy (TS) with a first-come-first-serve (FCFS) system. The results indicated that economically poor patients were more likely to self-select the FCFS due to more benefits. Even though the TS sometimes was more effective in addressing the needs of the poorest patients. However, the policy may distort supply-side incentives, leading to an increase in market prices for low-cost drugs while leaving high-cost drugs unaffected (Callejas & Mohapatra, 2021).

57. **Boche et al., (2022)** performed a mixed to evaluate pharmaceutical procurement practices and challenges at the Ethiopian Pharmaceuticals Supply Agency. It highlighted deficiencies, such as extended lead times, poor forecast accuracy, and difficulties including poor data quality, staff limitations, and communication problems, but also found benefits, such as using a procurement list and obtaining favourable pricing for the majority of items (Boche et al., 2022).

58. **Ke et al., (2024)** evaluated the impact of centralized drug procurement policy (CDP) on the drug price and availability of drugs. Since 2018, China's coordinated CDP helped to lower drug prices and hence patient costs while guaranteeing steady drug supply and market shares for successful businesses (Ke et al., 2024).