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Article

A study of India's 'People's Medicine Scheme': Policy recommendations and insights to promote and improve access to generic medicines based on pilot survey in Bengaluru Urban District, India

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Abstract: Access to affordable and quality medicines plays a vital role for achieving Universal Health Coverage and in reducing out-of-pocket expenditures (OOPE) for households especially in developing nations such as India. Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP), a Government of India initiative, aims to make low-cost and quality generic drugs and surgical equipment accessible to all segments of the population through its dedicated store outlets known as Pradhan Mantri Bhartiya Janaushadhi Kendra (PMBJK). In this study, a pilot survey comprising 20 stores/PMBJKs and 150 citizens was undertaken in the Bengaluru Urban District, India to understand various aspects of the PMBJKs including availability of drugs, stock-outs, accessibility to stores, perception and awareness levels along with challenges faced by store owners and citizens/beneficiaries. Based on the survey results, we capture the availability of drugs for 35 medicines and consumables belonging to 12 therapeutic categories across 20 store outlets. We also provide valuable insights and interdisciplinary recommendations on several facets including adopting technology-based measures for day-to-day functioning of stores, need for in-depth supply chain analysis for ensuring availability of drugs, encouraging prescription of generic medicines, increasing awareness levels in addition to promoting grassroot-level research, surveys and feedback mechanisms. These suggestions are expected to find their utility in policy-making, strengthen the implementation of the PMBJP scheme across Bengaluru and India as well as contribute towards achieving related Sustainable Development Goals.

Keywords: generic drugs; out-of-pocket expenditure (OOPE); Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP); Pradhan Mantri Bhartiya Janaushadhi Kendra (PMBJK); universal health coverage (UHC)

1. Introduction

An important factor which plays a paramount role in reducing out-of-pocket expenditures (OOPE) for households is availability and accessibility of affordable and quality medicines. OOPE are direct expenses made and borne by households at the point of receiving healthcare (Jalali et al., 2020; Ozawa et al., 2019; National Health Account Technical Secretariat, National Health Systems Resource Centre, Ministry of Health and Family Welfare, 2023). Reliance of households on OOPE for financing healthcare may lead to various repercussions including impoverishing households, aggravating poverty among already poor households and limiting attainment of

Universal Health Coverage (UHC) (Garg and Karan, 2009; Selvaraj et al., 2018; Selvaraj et al., 2022). In India, it is estimated that high OOPE related to healthcare impoverishes approximately 55 million individuals yearly, with more than 17% households experiencing catastrophic healthcare expenditures annually (Selvaraj et al., 2022). Previous literature suggests that the burden of out-of-pocket (OOP) spending on health is relatively higher among socio-economically backward households in India (Karan et al., 2014). Several studies indicate that medicines comprise the largest constituent of OOPE by households in India (Ambade et al., 2022; Selvaraj et al., 2018; Vasudevan et al., 2019). Thus, access to affordable and quality medicines is crucial in reducing OOPE for Indian households. Simultaneously, it also paramount in achieving Sustainable Development Goal 3 (SDG) of the United Nations 2030 Agenda for Sustainable Development—'Good Health and Well-being', especially the 8th target which aims to 'Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all' (United Nations Development Programme, 2023).

In this regard, 'Pradhan Mantri Bhartiya Janaushadhi Pariyojana' (PMBJP), an initiative of the Indian Government has played a paramount role with its objective of publicizing generics and making quality-assured medicines, consumables and surgical items available at affordable prices for all strata of the society through dedicated stores and thus decreasing consumer OOPE (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023a). Simultaneously the initiative also aims to create employment opportunities for youth through its country-wide store outlets. PMBJP was earlier known as 'Jan Aushadhi Scheme' (JAS) and was launched in 2008 by the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India. Pharmaceuticals and Medical Devices Bureau of India (PMBI) is the implementation agency of the scheme. However, until May 2014, only 80 JAS outlets were functional across the entire country (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023a; Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023b). In November 2016, the scheme was revamped as PMBJP and enforced with a series of measures. As of 26 December 2023, 10000+ stores function throughout the country which have led to a cumulative savings of more than Indian Rupees (INR) 23000 crores (INR 230 billion) for the Indian citizens (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023a). In recent years, owing to various government policies and schemes including PMBJP there has been significant improvement in terms of reduction of OOPE in India. As per National Health Estimates (2018–2019) released in 2022, the per capita OOPE stands at INR 2155 which has reduced by 8% from INR 2366 in 2013–2014. OOPE as a percentage of current health expenditure (CHE) has also declined from 69.1% in 2013–2014 to 53.2% in 2018–2019. Although OOPE as a percentage of total health expenditure (THE) has decreased greatly by 16% points, from 64.2% to 48.2% in the same period, yet, it still remains high with India being placed 66th in the group of 189 countries in terms of OOPE Capita as per Global Health Expenditure Database (GHED) for 2017 allowing the opportunity for considerable scope of improvement (National Health Account Technical Secretariat, National Health Systems Resource Centre, Ministry of Health and Family Welfare, 2023).

In the past few years, research studies on various facets of PMBJP have been

conducted across different parts of India. Arunkumar et al. (2021) studied the customer buying pattern of generic medicines from PMBJKs based on a survey of 150 citizens in the city of Coimbatore in Tamil Nadu. Through principal component analysis, their findings revealed that citizens' awareness, cost and quality of medicines, promotional activities, and availability of required medicines in Jan Aushadhi medical stores were the key factors influencing the customer buying pattern. Dey and Mukherjee (2019) studied the comparison of cost between branded and generic medicines available for Cancer and Diabetic drugs in the Mumbai and Thane region. The authors found generic medicines to be much cheaper, however, found price discrepancy between the generic drugs available at different PMBJKs. Lavtepatil and Ghosh (2022) studied the availability and affordability of generic medicines across 11 PMBJKs in Mumbai and Palghar districts. They found that availability of essential drugs was low (47%) and around 50% and 42% of medicines were found to be out of stock for the period of 3–6 months respectively in both districts. The generic medicines prices ranged from 0.01 to 0.47 of a day's wages for unskilled paid workers in Maharashtra. There is a paucity of research which focuses on assessing various aspects of PMBJP especially with regard to store outlets and on providing insights related to the availability, accessibility, perception and awareness levels as well as challenges faced by both PMBJK owners and citizens/beneficiaries. This research paper focuses on the aforementioned topics and provides several insights and recommendations based on qualitative and quantitative surveys conducted across 20 PMBJKs and 150 citizens in Bengaluru Urban District. Section 2 delineates the materials and methods. Section 3 presents the results of both the quantitative and qualitative survey. Section 4 provides interdisciplinary recommendations whereas section 5 comprises the Conclusion.

2. Materials and methods

The area of study pertinent to the survey is located in the Indian state of Karnataka's Bengaluru Urban District which has a population of 9,621,551 (approximately 9.7 million) as per the last census (Census, 2011). The district comprises Bengaluru city which is the state capital of Karnataka and is also known as the IT capital of India. The pilot survey comprises 20 PMBJKs in the district with the majority located in the Bengaluru South Parliamentary Constituency. Currently, more than 1800 high quality medicines and 285 surgical items are available for sale at these PMBJKs (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023a). **Figure 1** illustrates the study area at different scales.

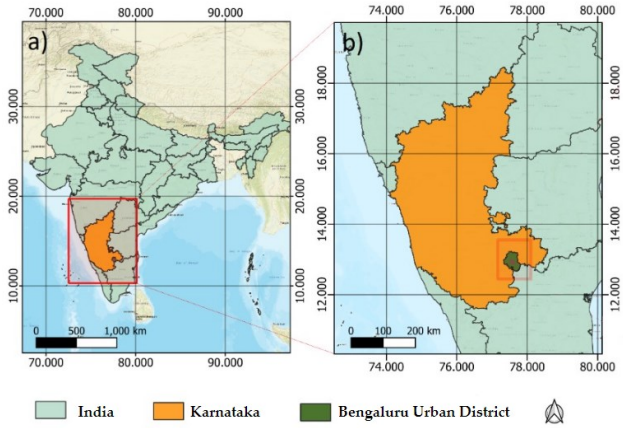

Figure 1. Study area. **(a)** State of Karnataka in India; **(b)** Bengaluru Urban District in State of Karnataka.

The survey applies a mixed approach, consisting of a quantitative survey component of 20 stores to assess the availability of the drugs at the chosen PMBJKs. The PMBJKs/store outlets were selected based on the willingness of the store owners to participate in the respective surveys. This is supplemented by a qualitative field survey component for both 20 store outlet owners and 150 citizens. The citizen's survey was undertaken partially online through a self-reported online procedure of data collection due to covid restrictions and precautions at the time of undertaking the survey. As a result, the sample size pertaining to the citizen's survey is not balanced with regards to gender, age, income levels and education. The surveys were carried out between February 2022–March 2023. Anonymity has been maintained in collection of data during the survey. The quantitative survey related to availability of drugs in PMBJK is available in Appendix A. Two separate questionnaires were prepared for the PMBJK Owners and Citizens/Beneficiaries to garner a wider perspective. The questionnaires for Citizens and Owners are available in Appendix B and Appendix C respectively. MS Excel was used to analyze the quantitative data to assess the availability of selected drugs which is further explained in detail in section 3.1. Additionally, the surveys comprise questions which can broadly be categorized in the following themes.

- Availability of drugs and stockouts at PMBKs;
- Awareness about the PMBJP store outlets and their accessibility;
- Medium of awareness for owners and citizens/beneficiaries;
- Perception of PMBJKs by Owners and citizens/beneficiaries;
- Problems faced/Miscellaneous Questions/Suggestions for improvements.

3. Results

3.1. Availability of drugs

To capture the dynamics of drug availability across the 20 PMBJKs, the survey included a separate questionnaire to record the current availability as well as the stock-out period of select medicines. The drug availability survey questionnaire is available in Appendix A Table A1 and has been adopted from Lavtepatil and Ghosh (2022). For

selecting essential medicines, the authors had followed a two-step methodology. This included reviewing medicines listed on WHO-HAI (World Health Organization-Health Action International) list, India's essential medicine list and drugs listed under various national health programs which was then followed by choosing essential drugs from the product basket of PMBJP. The final list consists of 35 medicines across 12 therapeutic categories (Anticancer, Antimicrobial, Cardiovascular, Antiasthmatics, Antidiabetics, Palliative care medicines, Medicines used for electrolyte imbalance, Antipsychotic, Antiepileptics, Analgesic, Antacids, Vitamins) and 2 consumables whose availability and stock-outs were surveyed across the 20 PMBJP stores outlets. Availability has been defined as the proportion of PMBJKs/store outlets in which the drugs and consumables are available at the time of the survey (Lavtepatil and Ghosh, 2022). Availability is calculated for each specific therapeutic category across all stores with the below formula:

$$\frac{\sum(n) * 100}{P * N} \quad (1)$$

Here, n is the number of drugs available in a specific therapeutic category in the PMBJK/store on the survey date. N is the total number of drugs in the specific therapeutic category and P is the total number of store outlets. **Table 1** depicts the percentage of available, non-moving and different stock-out duration for each therapeutic drug category whereas **Table 2** depicts the same for each of the 35 drugs across all the surveyed 20 store outlets. We discuss these results in section 4.1.

Table 1. Availability and Stock-out duration for Therapeutic Drug Category across all 20 PMBJKs.

Therapeutic drug category	Availability (%)	Non-Moving (%)	Stockout duration between 0–3 months (%)	Stockout duration between 3–6 months (%)	Stockout duration ≥ 6 months (%)
Antimicrobial	27.86	48.57	7.14	5	11.43
Cardiovascular	94.16	5	0	0.84	0
Antidiabetics	86.66	11.67	1.67	0	0
Palliative care	80	20	0	0	0
Anticancer	18.33	75	0	5	1.67
Antipsychotic	32.5	55	5	2.5	5
Antiepileptics	47.5	10	2.5	17.5	22.5
Antiasthmatic	82.5	12.5	5	0	0
Analgesic	72.5	20	5	0	2.5
Antacids	92.5	7.5	0	0	0
Electrolyte balancer	65	32.5	0	2.5	0
Vitamins	75	22.5	0	2.5	0
Consumables	95	2.5	0	2.5	0

Table 2. Availability and stock-out duration for the 35 therapeutic drugs across all 20 PMBJKs.

Therapeutic drug category	Drug name	Availability (%)	Non-Moving (%)	Stockout duration between 0–3 months (%)	Stockout duration between 3–6 months (%)	Stockout duration ≥ 6 months (%)
Antimicrobial	Acyclovir	15	65	0	5	15
	Amoxicillin	35	20	5	10	30

Table 2. (*Continued*).

Therapeutic drug category	Drug name	Availability (%)	Non-Moving (%)	Stockout duration between 0–3 months (%)	Stockout duration between 3–6 months (%)	Stockout duration ≥ 6 months (%)
	Amoxicillin (A) + Clavulanic acid (B)	60	5	15	5	15
	Ceftriaxone	20	70	0	0	10
	Ciprofloxacin	40	15	25	15	5
	Co-trimoxazole	10	80	5	0	5
	Fluconazole	15	85	0	0	0
Cardiovascular	Atenolol	100	0	0	0	0
	Enalapril	100	0	0	0	0
	Clopidogrel	95	5	0	0	0
	Atorvastatin	100	0	0	0	0
	Telmisartan	100	0	0	0	0
	Nifedipine	70	25	0	5	0
Antidiabetics	Glimepiride	95	0	5	0	0
	Metformin	100	0	0	0	0
	Premix Insulin Injection	65	35	0	0	0
Palliative care	Amitriptyline	90	10	0	0	0
	Diazepam	70	30	0	0	0
Antineoplastic/ Anticancer	Cyclophosphamide	15	80	0	5	0
	Cisplatin	5	90	0	5	0
	Imatinib	35	55	0	5	5
Antipsychotic	Fluoxetine	60	20	10	5	5
	Fluphenazine	5	90	0	0	5
Antiepileptics	Carbamazepine	65	10	0	20	5
	Phenytoin	30	10	5	15	40
Antiasthmatic	Budesonide	70	20	10	0	0
	Salbutamol	95	5	0	0	0
Analgesic	Diclofenac	90	0	10	0	0
	Tramadol	55	40	0	0	5
Antacids	Omeprazole	90	10	0	0	0
	Ranitidine	95	5	0	0	0
Electrolyte Balancer	Oral rehydration Salt	100	0	0	0	0
	Sodium chloride	30	65	0	5	0
Vitamins	Ascorbic acid (Vitamin C)	75	25	0	0	0
	Calcium carbonate	75	20	0	5	0
Consumables	Glucometer test strip	95	0	0	5	0
	Glucometer digital	95	5	0	0	0

3.2. Awareness about PMBJKs and their accessibility

To assess the awareness about the PMBJKs/store outlets and the ease of accessing the same, the survey consisted of the several questions on level of awareness about

PMBJK across different demographics, medium of awareness about PMBJK as well as accessibility of the PMBJKs.

3.2.1. Awareness about PMBJKs based on demographics

To garner insights on the awareness of PMBJK/PMBJP among citizens, the responses of the survey are primarily classified based on whether the respondents are aware or not aware of the PMBJKs for different demographic categories including Gender, Age, Income Level and Educational Qualification. Overall, among the 150 respondents of the survey, it was found that around 52% citizens (n = 78) were aware about PMBJP/PMBJK and 48% (n = 72) were not aware (**Figure 2a**). ~67% (n=101) are male respondents while ~33% (n = 49) are female respondents. Out of the 101 male respondents, approximately 56% (n = 57) are well-informed of PMBJK whereas among the total female respondents (n = 49) around ~43% (n = 21) are well-informed of PMBJK. It can be seen from **Figure 2b** that based on the qualifying education levels, only 50% (n = 27) among the 54 postgraduates, ~48% (n = 27) from the 56 undergraduates and 60% (n = 24) of the 40 senior secondary respondents were cognizant about PMBJK respectively.

Figure 2c depicts the awareness of citizens about PMBJKs based on varying age groups and income levels of the surveyed citizens. Among the different age groups of individuals, ~17% (n = 26) of the total respondents are between 18–25 years and ~58% (n = 15) of them are unaware of PMBJK. Around 23% (n = 35) citizens of the respondents are in the 25–35 years of age group of which 60% (n = 21) are not apprised of the store outlets. Approximately 43% (n = 64) respondents identified themselves in the age group of 35–55 years and among these ~58% (n = 37) of citizens are aware of PMBJK. Around 17% (n = 25) of the surveyed individuals are above 55 years in age and among these 64% (n = 16) are well-informed about PMBJK.

Further, respondents were also segregated based on income levels as shown in **Figure 2d**. The per capita state income of Karnataka at current prices is estimated to be INR 301,673 as per Economic Survey of Karnataka released in 2023 whereas the per capita income of India is INR 170,620 (Economic Survey of Karnataka, 2023). As such, the income levels are classified as below 10 K/month, between 10–25 K/month, 25–40 K/month and Above 40 K/month. The classification 10 K/month and 10–25 K/month fall below the per capita income of Karnataka whereas the remaining fall above. Around 33% (n = 50) respondents belonged to 'Below 10K' category, 36% (n = 54) belonged to between '10K–25K' category, ~17% (n = 25) were in '25K–40K' categories and 14% (n = 21) fall in the 'Above 40K' category. The proportion of citizens aware about the scheme and PMBJK in each of the above categories considered individually were 56% (n = 28), ~46% (n = 25), 52% (n = 13) and ~57% (n = 12) respectively.

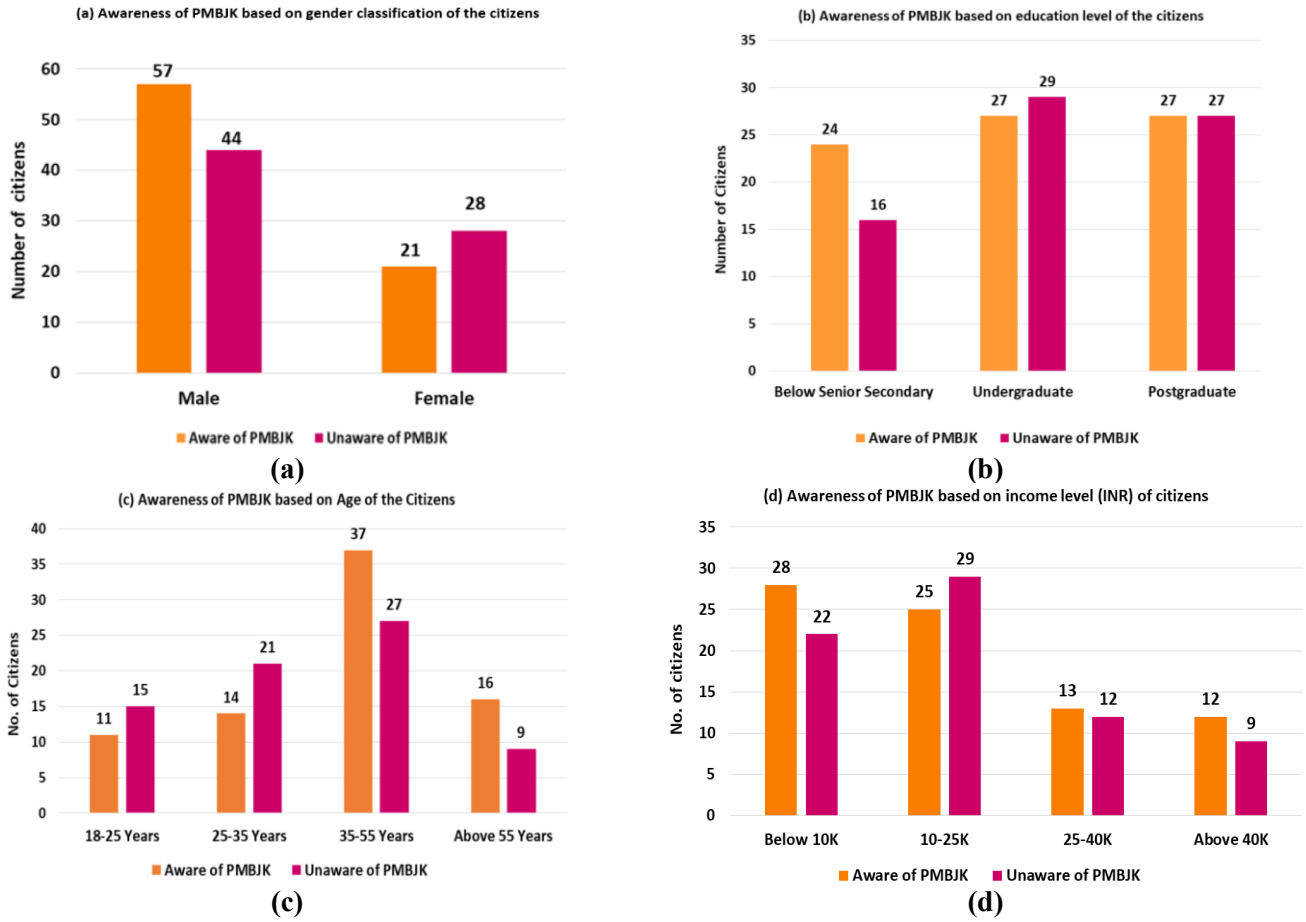

Figure 2. (a) awareness about PMBJK based on gender classification of citizens; **(b)** awareness about PMBJK based on Education level of the citizens; **(c)** awareness about PMBJK based on age of the citizens; **(d)** awareness about PMBJK based on income level (INR) of citizens.

3.2.2. Accessibility of PMBJKs and medium of awareness

As depicted in **Figure 3a**, from the 78 respondents around 46% (n = 36) of citizens came to know about the scheme and store outlets through Word of mouth. This was followed by ~29% (n = 23) being apprised through PMBJK Outlets, ~10% (n = 8) by Television. ~6% (n = 5) citizens were made aware through Newspaper and ~3% (n = 2) were informed by doctor. A total of 5% (n = 4) citizens were also apprised through 'other' means including social media (n = 2), proximity of the store outlet to the workplace (n = 1) and informed by visit to another medical store (n = 1). For the case of 20 surveyed PMBJK owners, word of mouth played a big role in making 55% (n = 11) of the owners aware about the scheme followed by newspapers (n = 3, 15%), others (n = 3, 15%), already existing PMBJK outlets (n = 2 ,10%) and television (n = 1, 5%). 'Others' included social media platforms and radio. This is depicted in **Figure 3b**. We further discuss the implications of these results in the discussion section 4.3.

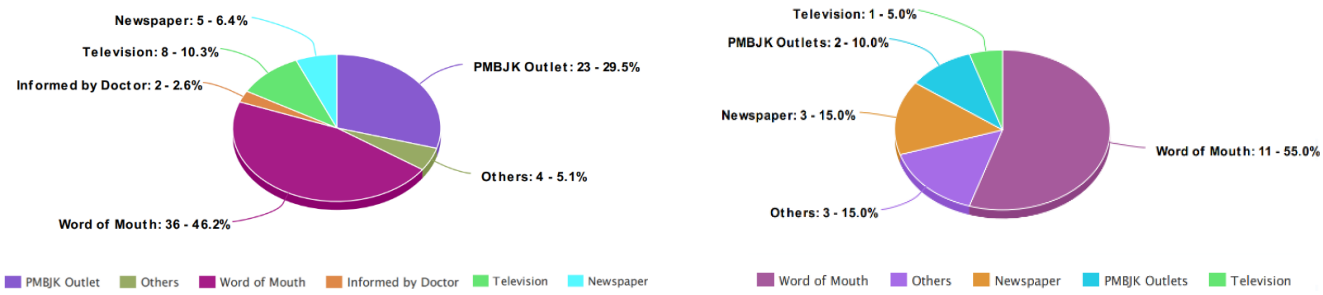

Figure 3. (a) medium of awareness about PMBJK for citizens; **(b)** medium of awareness about PMBJK for owners.

3.3. Perception of PMBJKs among citizens

To assess the perception of PMBJKs from the beneficiary's viewpoint, questions were included in the survey which focused on assessing the trends in regular purchase of medicines at PMBJKs by beneficiaries, citizens preferring PMBJKs to purchase generic medicines and the level of satisfaction of customers with PMBJKs in terms of functioning and cost savings. The results are depicted in **Figure 4a,b** respectively. It can be observed that from the 78 respondents aware of PMBJK, a very high majority comprising ~97% citizens (n = 76), preferred PMBJKs for purchase of medicines. Additionally, among these 78 citizens, ~81% citizens (n=63) identified themselves as regularly purchasing medicines from PMBJK as shown in **Figure 4a.** Within 78 citizens, ~85 % citizens (n = 66) are extremely satisfied with PMBJKs, ~14% citizens (n = 11) are satisfied and a sole citizen (n=1) expressed dissatisfaction owing to repeated unavailability of specific medicines in the PMBJP product basket. Thus, a very high percentage of citizens are satisfied with PMBJKs and prefer the stores for regularly purchase generic medicines.

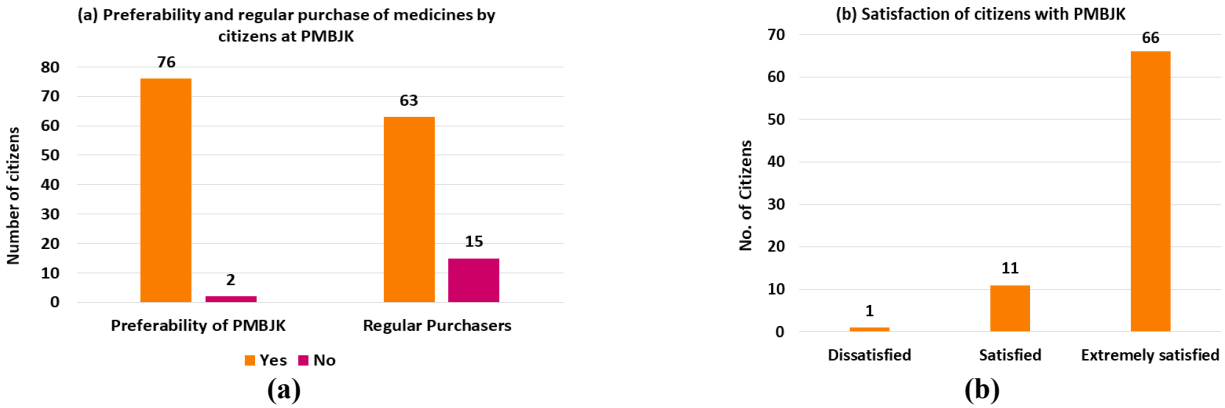

Figure 4. (a) preferability for PMBJKs and Regular purchase of medicines at PMBJKs by citizens; **(b)** levels of citizen's satisfaction with PMBJK.

3.4. Perception of PMBJKs among owners

The survey also incorporates questions to assess the perception of store owners along with a couple of miscellaneous questions. These include:

- Perception of PMBJK as a good opportunity for business/entrepreneurship;
- Rating the overall process of establishing a PMBJK;

- Willingness of current store owners to set up new additional PMBJKs;
- Whether PMBJK owners received branded medicine prescriptions from customers;
- Effectiveness of standees/banners in spreading awareness among customers.

One of the major objectives of the PMBJP scheme is to generate employment and encourage individual entrepreneurs and as such, the above questions become pertinent. In our survey, 95% of the owners (n = 19) perceived PMBJK as a good business opportunity as shown in **Figure 5a**. Existing owners in the survey showed willingness to set up new PMBJKS in addition to new entrepreneurs. A total of 45% (n = 9) of the owners expressed their willingness to set up additional PMBJKS, 25% (n = 5) showed optimism but had not made a decision yet and the remaining 30% (n=6) were not eager to set up additional store outlets. The overall process of setting up a PMBJK was rated as easy by 50% (n = 10) of the store owners and average by 30% (n = 6) with the remaining 20% (n = 4) rating the process as difficult. Our survey revealed that among the 20 PMBJK owners, 70% owners (n = 14) had experienced at least 1 or more instances wherein they received branded medicine prescriptions from customers as depicted in **Figure 5b** while 80% owners validated the effectiveness of banners/standees placed as an effective tool for promoting the scheme and stores. Thus, a considerable positive response has been seen among the surveyed owners in terms of perceiving PMBJK as a good business, ease of opening of PMBJK and willingness to open a new Kendra. Faster clearances and approval for setting up PMBJKs, timely incentives to owners and better availability of medicines are expected to further help increase the already significant positive outlook of PMBJK. Perception of PMBJK as a good opportunity for business/entrepreneurship.

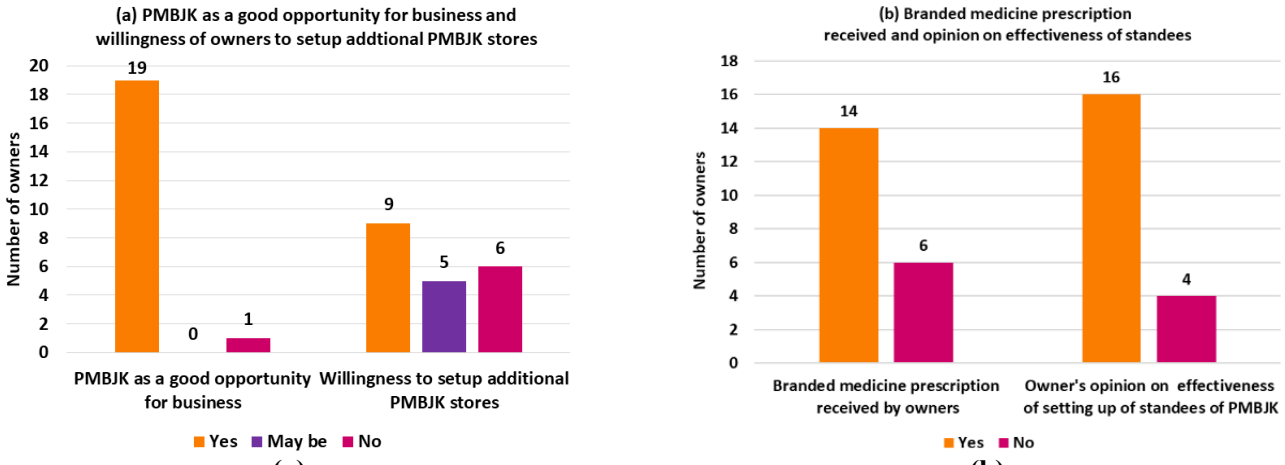

Figure 5. (a) PMBJK as a good opportunity for business and willingness of the owners to set up additional PMBJK stores; **(b)** branded medicine prescription received and opinion on effectiveness of setting up of standees of PMBJK.

4. Discussion

4.1. Ensuring availability of drugs

The availability of the drugs and consumables based on our survey results across all 20 PMBJKs in **Table 1** have further been segregated into Low Availability (< 35%),

Moderate Availability (35%–65%) and High Availability (> 65%) and is presented in **Table 3**. It can be observed that the Consumables and Anticancer category possess the highest and lowest availability at 95% and 18.33% respectively. Anticancer (18.34%), Antimicrobial (27.85%) and Antipsychotic (32.5%) fall in low availability whereas Antiepileptics (47.5%) and Electrolyte balancers (65%) are moderately available. Remaining therapeutic drug categories fall under high availability. **Figure 6** based on **Tables 1** and **2** focuses on proportion of available, stock-out and non-moving drugs across various therapeutic categories. Stock-out of drugs is further classified as Stock-out duration between 0–3 months, Stock-out duration between 3-6 months and Stock-out duration greater than equal to 6 months. Antimicrobial drugs, anticancer drugs and psychological disorder drugs are 'non-moving' at 48.57%, 75% and 55% respectively. The antiepileptic drugs are stocked out at the high rate of 17.5% and 22.5% for about 3–6 months and above 6 months respectively, amongst all the other therapeutic drugs.

Table 3. Availability grades of the Therapeutic categories.

Low availability (<35%)	Moderate availability (35%–65%)	High availability (>65%)
Anticancer (18.34%)	Antiepileptics (47.5%)	Analgesic (72.5%)
Antimicrobial (27.85%)	Electrolyte balancers (65%)	Vitamins (75%)
Antipsychotic (32.5%)	-	Palliative care (80%)
-	-	Antidiabetics (86.67%)
-	-	Antiasthmatic (82.5%)
-	-	Antacid (92.5%)
-	-	Cardiovascular (94.17%)
-	-	Consumables (95%)

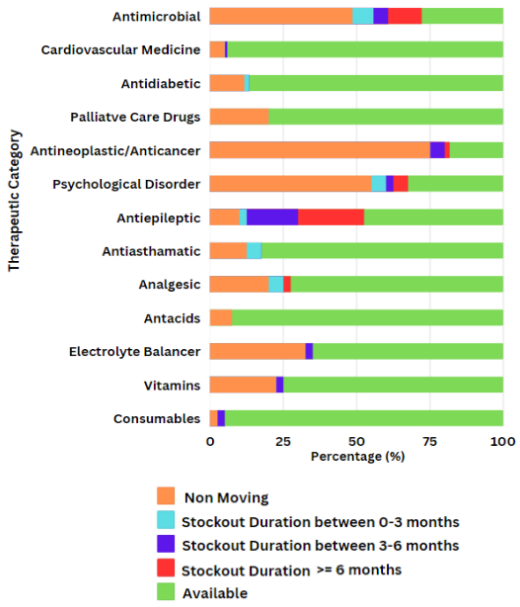

Figure 6. Availability, non-moving, stock-out durations of therapeutic drugs across the 20 surveyed PMBJKs.

The prominent reasons behind unavailability are two: Firstly, the drug not being available from the distributor thus resulting in stock-out. Second, the drug being 'non-

moving' i.e., having not much demand and hence discouraging PMBJK owners to place orders for the same. We recommend that a detailed analysis be undertaken for comprehending the nuances related to demand and availability of drugs at local, regional, state and national level for optimizing the existing supply chain which is out of scope of the current study. Special emphasis needs to be placed on identifying non-moving drugs from the PMBJP product basket specifically for each individual region as it can vary for different areas. This would also help increase repeat customers and positive perception of PMBJP scheme and PMBJKs.

4.2. Leveraging technology-based interventions

Several responses to questions for open suggestions received during the qualitative survey suggested leveraging tech-based interventions to further increase the beneficiary/citizen satisfaction, transparency and PMBJK functioning. These are delineated below:

Presently, citizens do not have access to real time information on availability of drugs at the store outlets. We recommend that real-time availability of drugs at a particular PMBJK/store outlet could be made visible on the already existing dedicated mobile application 'Jan Aushadhi Sugam'. This will help in increasing transparency and facilitating visits by customers to PMBJKs while simultaneously helping in saving time and money. We also suggest exploring the feasibility of online purchasing from stores and door-step delivery.

The viability of creation of a platform where PMBJK owners can post vacancies related to pharmacist openings in stores can be explored. This would further help PMBJK owners in facilitating opening and functioning of stores as there are many instances where store owners need to hire qualified pharmacists to operate the stores.

In addition, during our survey it was revealed that the PMBJK owners were mostly utilizing third party applications/search engines for mapping branded to generic medicines in case the customers would hand them a prescription containing branded medicine. In such scenarios, having an official software application for the same would be useful for citizens and store owners.

4.3. Increasing awareness regarding PMBJP and PMBJKs

One of the crucial factors in the success of implementation of a scheme is the awareness of the scheme among its target audience. From the results in section 3.2.2 and in **Figure 3a**, it can be seen that 'Word of mouth' and 'PMBJK' i.e., the store outlet itself plays a significant role in increasing the awareness of PMBJKs with a combined overall percentage of ~76%. In this regard, it is recommended that several on-ground measures are taken for the same especially with regard to promotion of the scheme and spreading awareness through the stores. For instance, Standees/Hoardings can be placed around the PMBJKs at popular places to further increase the impact and awareness of PMBJKs. In Bengaluru South Parliamentary Constituency of the Bengaluru Urban District, such standees have been made available for all the PMBKs with the support of the Member of Parliament's office. These hoardings and standees/banners have been placed around at popular places such as restaurants, hotels, temples around each PMBJK to further expand their reach. Our survey also

documented the owners confirming the effectiveness of the standees in creating awareness with 16 out of the 20 store owners (80%) affirming the same (**Figure 5b**). We recommend that the above measures be replicated across other parliamentary constituencies for increasing awareness regarding PMBJP scheme and associated PMBJKs. The results in section 3.2.1. also indicate that citizens below 35 years are less aware when compared to higher age groups. We recommend making young citizens better acquainted with the PMBJP scheme and its benefits through youth-focused awareness programs especially in government schools and colleges. Only ~2.6% citizens were made aware of the PMBJKs by doctors and hence, measures should be taken to encourage doctors to inform customers regarding for the same. Social media as a medium of awareness was recorded only for 2% of the surveyed citizens as mentioned in Section 3.2. In this regard, social media campaigns comprising interviews with beneficiaries and store owners can be effective modes as well. The aforementioned initiatives can help towards disseminating the scheme and its benefits.

4.4. Flexibility in distance-based permission criteria to open PMBJKs

At the time of conducting the survey in 2022, a distance policy of 1 km was enforced while approving a new PMBJK for cities (Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad) and districts having population equal to or more than 10 lacs (1 million). In other words, the distance between 2 store outlets should be at least 1 kilometer. In contrast, for districts with population less than 10 lacs (1 million), a distance policy of 1.5 km is enforced while approving the opening of a new PMBJK (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2022). Open suggestions captured during our survey from store owners proposed that in densely populated areas of districts, the restrictions regarding distance policy could be flexible based on population density of the particular area. In this regard, population density-based permission criteria for opening of new store outlets can be explored which would further help to increase the accessibility regarding the PMBJKs. It is worth mentioning that in its recent notification in December 2023, the guidelines have been amended. Presently, a distance policy of 1 km is enforced for all districts while approving a new PMBJK i.e., distance between 2 store outlets should be at least 1 km (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023c). Also, distance policy restrictions are not observed in vicinity areas of District Government and Private Hospitals possessing more than up to 500 m or with hospitals associated with medical colleges. The decision regarding the location and new kendras is now determined based on feasibility of location after market survey (Pradhan Mantri Bharatiya Janaushadhi Pariyojana, 2023c).

4.5. Encouraging prescription of generic names of medicines

Our survey revealed that of 20 PMBJK owners, 70% owners (n = 14) experienced at least 1 or more occasions wherein they received branded medicine prescriptions from customers (**Figure 5b**). Patients are usually unaware of the medicine's generic name or even the existence of generics and usually leave the decision of drug selection to doctors (Yuvanesh and Geetha, 2021). The National Medical Commission in its

recent regulation, issued on 2 August 2023 stated that 'Registered Medical Practitioners should prescribe drugs using generic names written legibly', mandating doctors and medical practitioners to prescribe generic drugs (National Medical Commission, 2023a). However, the guidelines were later held in abeyance on another notification issued on 23 August 2023 (National Medical Commission, 2023b). It is interesting to note that in countries such as the UK, generic substitution by pharmacists is a usual practice (Duerden and Hughes, 2010). Our survey results also indicate that only 2.6% of respondents were informed regarding the stores by doctors. We suggest encouraging doctors for prescription of generic medicines and apprising citizens regarding generics and PMBJP. To also gain further insights on the prescription of generic medicines by medical practitioners, we intend to include a separate question for citizens to inquire on whether they have received generic medicines prescriptions or branded medicines prescriptions in our future survey. Also, as mentioned previously in section 4.2., a software application for mapping branded medicines to generics will be helpful in such scenarios.

4.6. Limitations of current study, promoting further research and feedback mechanisms to aid policy-making

The results presented in this study have certain limitations. The citizen's survey was undertaken partially online through a self-reported online procedure of data collection due to covid restrictions at the time when the survey was being undertaken. Thus, the sample size pertaining to the citizen's survey is not balanced with regards to gender, age, geographic locations within the district, income levels and education. The pilot study also consisted of surveying 20 PMBJK owners who were willing to participate. This could potentially lead to bias. Appropriate sampling strategies and measures to avoid aforementioned limitations need to be considered in future studies. Additionally, since this is a pilot survey, various other aspects such of PMBJKs such as perceptions and survey of medicinal practitioners, cost comparison between generic and branded medicines, survey across a larger distributed sample, and other avenues of research have been left for future studies. These can help reveal insights which can be useful for decision and policy-making, as well as for aiding the day-to-day functioning of the stores. We also delineate a few more avenues for research below.

One thematic area is to understand the variation in store sales and factors influencing the same. These factors could be associated with various parameters such as population density, presence of private/government hospitals, residential, commercial areas or the socio-economic condition of the population in the vicinity of the stores. Studying these influences can further help in understanding the variation in sales, aid in related forecast models and optimizing decision-making related to deciding store location.

Other avenues for research include analyzing the cost and sales of various drugs/medical items in the PMBJK product basket in comparison to branded drugs currently available in the market. Such studies can be taken up for store outlets at individual, district and state level. Additionally, feedback mechanisms should be developed to regularly aggregate feedback from store outlet owners as well as beneficiaries at grassroot-levels. We also recommend that further research and studies

should be encouraged and conducted by academic institutions, government organizations, think-tanks and other relevant establishments to comprehend the various factors influencing the functioning of the PMBJK stores. This can contribute towards better comprehension of customer consumption patterns, demand and supply and subsequently help with optimizing supply chain and availability of drugs. Overall, the aforementioned avenues need to be explored to facilitate research and better comprehension of various aspects of PMBJP. These are expected to contribute to policy-making and strengthen the implementation of the PMBJP scheme.

5. Conclusion

Through this research, we have provided various insights and interdisciplinary recommendations to help strengthen the PMBJP scheme in India which aims to create awareness and make available low-cost quality generic medicines across all strata of the society while simultaneously generating employment through establishment of dedicated store outlets. The recommendations based on our qualitative and quantitative surveys across 20 stores and 150 citizens in the Bengaluru Urban district include leveraging technology-based interventions, ensuring availability of drugs, encouraging prescription of generic medicines, increasing awareness regarding PMBJKS especially among youth and lower-income level communities, and encouraging further research and feedback mechanisms at grassroot levels. This pilot survey also paves the way for future studies and a more comprehensive survey for the Bengaluru Urban District. PMBJKs which function as the pillars of the PMBJP scheme continue to play a paramount role in India in ensuring access to affordable and quality drugs, contributing to UN SDGs and promoting Universal Health Coverage.

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Appendix A

Table A1. Drug availability survey questionnaire.

PMBJP Kendra ID				**Date of survey**	
Therapeutic drug category	**Drug name**	**Type of formulation**	**Strength**	**Currently Available (Yes/No)**	**If not available, stockout duration/Other Reason**
Antimicrobial	Acyclovir	Tab	200 mg		
	Amoxicillin	Cap	250 mg		
	Amoxicillin (A) + Clavulanic acid (B)	Tab	500 mg (A) + 125 mg (B) Oral		
	Ceftriaxone	Inj	1 g powder		
	Ciprofloxacin	Tab	500 mg		
	Co-trimoxazole	Suspension	Oral liquid 200 mg (A) + 40 mg (B)/5 mL		
	Fluconazole	Inj	200 mg		
Cardiovascular	Atenolol	Tab	50 mg		
	Enalapril	Tab	5 mg		
	Clopidogrel	Tab	75 mg		
	Atorvastatin	Tab	10 mg		
	Telmisartan	Tab	20 mg		
	Nifedipine	Tab	10 mg		
Antidiabetics	Glimepiride	Tab	1 mg		
	Metformin	Tab	500 mg		
	Premix Insulin Injection	Tab	40 IU/mL		
Palliative care	Amitriptyline	Tab	25 mg		
	Diazepam	Tab	5mg		
Anticancer	Cyclophosphamide	Tab	50 mg		
	Cisplatin	Injection	1mg/mL		
	Imatinib	Tab	100 mg		

Table A1. (*Continued*).

PMBJP Kendra ID				**Date of Survey**	
Therapeutic drug category	**Drug name**	**Type of formulation**	**Strength**	**Currently Available (Yes/No)**	**If not available, stockout duration/Other Reason**
Antipsychotic	Fluoxetine	Cap	20 mg		
	Fluphenazine	Depot Inj	25 mg/mL		
Antiepileptics	Carbamazepine	Tab	200 mg		
	Phenytoin	Tab	100 mg		
Antiasthmatic	Budesonide	Inhaler	Inhalation (MDI/DPI) 100 mcg/dose		
	Salbutamol	Inhaler	Oral liquid 2 mg/5 mL Inhalation (MDI/DPI) 100 mcg/dose		
Analgesic	Diclofenac	Tab	50 mg		
	Tramadol	Cap	50 mg		
Antacids	Omeprazole	Cap	20 mg		
	Ranitidine	Tab	150 mg		
Electrolyte Balancer	Oral rehydration Salt	Powder	As licensed		
	Sodium chloride	Injection	0.45%/3%		
Vitamins	Ascorbic acid (Vitamin C)	Tab	100 mg		
	Calcium carbonate	Tab	250 mg		
Consumables	Glucometer test strip				
	Glucometer digital				

Appendix B

Table A2. Citizen's survey regarding PMBJK.

Questions	
Age	18–25 years
	25–35 years
	35–55 years
	Above 55 years
Gender	Male
	Female
Income level (Per Month-INR)	Below Rs 10,000
	10,000–25,000
	25,000–40,000
	Above 40,000
Education	Below Senior Secondary
	Graduate
	PostGraduate
Are you aware of Janaushadi Kendras?	Yes
	No
How did you find out about Janaushadi Kendras?	Word of mouth
	Television
	PMBJK Outlet
	Newspaper
	Informed by Doctor
	Others
Is there a PMBJK available near your residence?	Yes
	No
Would you consider PMBJKs to purchase your medicines?	Yes
	No
Do you regularly purchase medicines at PMBJKs?	Yes
	No
Rate your level of satisfaction with PMBJKs	Dissatisfied
	Satisfied
	Extremely Satisfied

Appendix C

Table A3. PMBJK owner's survey.

Questions	
PMBJK Store ID	
Gender	Male
	Female
How did you find out about PMBJP/PMBJK?	Word of mouth
	Television
	PMBJK Outlet
	Newspaper
	Others
As an owner, would you say that opening a PMBJK is a good business opportunity?	Yes
	No
Rate the process in terms of Ease of opening PMBJK	Dissatisfied
	Satisfied
	Extremely Satisfied
Do you perceive PMBJK as a good business opportunity?	Yes
	No
Would you be willing to set up more PMBJKs in other areas?	Yes
	No
Opinion on effectiveness of putting standees near the PMBJK	Yes
	No
Have you received branded medicine prescriptions from customers?	Yes
	No
Rate your level of satisfaction with PMBJKs	Dissatisfied
	Satisfied
	Extremely Satisfied