**Original Research Article**

**AN APPRAISAL OF THE ZERO-CAPITAL DRUG REVOLVING FUNDS (ZDRF) SCHEME FOR SURGICAL, ONCOLOGY AND PALLIATIVE CARE PATIENTS AT FEDERAL MEDICAL CENTRE MAKURDI (FMCM), NORTH CENTRAL NIGERIA**

**Abstract**

**Aim:** This study evaluated the impact of the ZDRF scheme at FMCM on improving access to essential medicines for patients undergoing surgical, oncology, and palliative care. The results indicated that ZDRF effectively enhanced the sustainable availability of quality medicines. However, it did not demonstrate a significant impact on drugs’ prices or patient utilization. Despite these limitations, the ZDRF led to a substantial revenue increase of over 450% compared to the traditional DRF model, indicating its potential as a better alternative for healthcare provision.

**Method:** The study was conducted at FMCM, through the administration of Open-ended questionnaires to 100 participants, 50 each of staff of FMCM and patients. Records of drug purchases, sales and revenue generated were extracted from the pharmacy and finance departments to compare the performances of both the traditional and ZDRF in terms of availability, cost, quality, and revenue generation.

**Study Design:** This cross-sectional study that used Open-ended questionnaires’ survey, administered to 100 participants, 50 each of staff and patients through a simple random sampling. The questionnaires enquired about patients views on drug availability, cost, and quality etc. Answers were based on a rating scale of 1-5. An informed consent was obtained through a short communication on the cover page of the questionnaire.

**Sampling:** simple random sampling was employed to eliminate bias and make the results more generalizable. A total of 50 respondents each of staff of FMCM and patients were recruited for the study. This was simple, fast and made the results more generalizable.

**Results:** The study found that the zero capital drug revolving fund significantly improved the sustainable availability of essential medicines at FMCM*, P=*0.000. The study also demonstrated that ZDRF drugs were of high quality*, P=0.001*. However, it was noted that the ZDRF had no significant level of drug patronage in the hospital*, P=0.44*. Similarly, the ZDRF did not have significant influence on the price of drugs within the hospital*, P=0.15*. While the revenue in the traditional DRF over a six month period (July-December, 2012) was 10, 825,683.00 Nigerian Naira, the revenue for corresponding period ZDRF over the subsequent six months (January to June, 2022), was 55,933,212.00 Nigerian Naira, (over 450% increase).

**Conclusion:** With heavy indebtedness, inefficient traditional DRF schemes, poor healthcare financing, unavailable startup funds (seed Money), and low health insurance coverage, the ZDRF becomes a better alternative to the sustainable provision of essential medicines that are affordable, safe and of high quality. It must not be a one cap fits all. Each state, community, and institution, should be able to identify a DRF model that gives the desired benefits to its people.

Keywords: Zero Capital, DRF, Essential medicines, Availability, Affordability, Quality

**1. INTRODUCTION**

According to the World Health Organization (WHO), health is “*a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity”.*

“One of the very major ways of measuring the quality of health care of a given community is the sustainable availability of essential medicines or drugs. Access to essential drugs is important for an efficient health care delivery. The provision of safe, effective and affordable drugs to the whole population at the right quantity is a priority in health and drug policy” [1].

“Essential medicines are those that effectively and safely treat the priority healthcare needs of the population. They are selected by taking into consideration public health relevance, evidence of benefits and harms, and with consideration of costs, affordability and other relevant factors” [2]. “The first WHO model list of essential medicines was published in 1977 and included about 200 medicines. Since the first model list in 1977, the number and scope of essential medicines LIST have grown overtime. Medicines requiring specialized medical care have been introduced, such as lung surfactants for newborn babies, targeted cancer treatments and medicines for multiple sclerosis” [2].

“When properly implemented, the essential medicines concept can help improve health outcomes and achieve progress towards universal health coverage (UHC). The essential medicine concept has been successfully implemented in various countries and regions. Essential medicines are associated with greater availability of essential medicines than non-essential medicines” [3], increased access [4], better prescribing and quality care, and cost savings [5].

“WHO estimates that nearly 2 billion people worldwide lack access to essential medicines. More than 50% of the population living in different countries in Africa have no access to essential medicines when they need them” [6]. “According to a study on access to medicine and affordable treatment for acute and chronic diseases in 36 developing and middle-income countries, the availability of generics in the public sector ranged from 29.4% in Africa to 54% in America” [7]

“Africa’s health sector is facing an unprecedented financing crisis, driven by a sharp decline of 70% in Official Development Assistant (ODA) from 2021-2025, and deep-rooted structural vulnerabilities. Compounding this is Africa’s spiraling debt with countries expected to service USD 81 billion by 2025, surpassing anticipated external financing. Abuja declaration 2001, a pivotal commitment made by African Union (AU) member states aimed to reverse this trend by pledging to allocate at least 15% of national budgets to health sector” (8). Only Rwanda, Botswana, and Cape Verde have consistently met or exceeded this target (9).

“The availability of drugs is one of the most visible symbols of quality care to consumers. In Nigeria, patients’ visit dropped by 50-70% when health facilities ran out of commonly used drugs (World Bank, 1994)” [10].

“The concept of Drug Revolving Fund (DRF) was introduced through the Bamako Initiative to be one of the ways of solving the challenges and difficulties in having availability of medicines” [11]. **“**DRF is a system whereby, the revenue generated from the sale of drugs to patients is used to purchase new drugs and ensure availability, effective and efficient system” [12]. The traditional DRF starts with an initial capital injection (seed money), which may be from a community, a health facility, government or even a non-governmental organization (NGO). In the Zero capital DRF, the initial capital is not provided upfront, instead the operator depends on a cost-recovery mechanism. Initial bulk purchases are done without any financial commitment, but once sold with appropriate markups, the initial cost is recovered while another bulk purchase is done. It requires strict and disciplined financial management and uses a dedicated account for that purpose.

In Nigeria, out of pocket payments for health care services is unacceptable and catastrophically high. The average coverage by the National Health Insurance Authority (NHIA), which would have absorbed protective risk is still under 10%, more than two decades after its inception. The teaching hospitals are indebted to pharmaceutical companies to the tune of over 3 billion naira [13**].** More worrisome is the fact that the performance of the National Health insurance ( which should provide the protective risk) through the Health Management organizations is abysmally poor, since many are owing healthcare providers huge sums on money, thereby impairing the ability of these healthcare providers facilities to replenish stock [14].

“Most DRFs in Nigeria failed mainly due to the inability of the hospitals and healthcare centers to pay for drugs supplied. Flexibility in approach and regular adaptation of strategies will be crucial to meet changing needs. It is not a one cap fits all. Each State should identify a model that gives maximum benefit to its citizens” [15].In a study across 6 states, from 4 geopolitical zone (2 each from the south and North, it was found that, the scheme was functional in only 11 (35.5%) of the facilities, almost two decades after its adoption in Nigeria [16]. It is therefore clear that the implementation of the DRF in Nigeria has not met the original target and aims of the Bamako initiative. There is every need by healthcare facilities to devise effective strategies for ensuring uninterrupted supply of essential drugs in their facilities.

In FMCM, there had existed a DRF which had completely collapsed due to inability to pay drug suppliers. We then had to look outside the box for and alternative. We employed this model of ZDRF principally to see how we could create a sustainable availability of essential medicines that are cheap and of high quality, especially for surgical, oncology and palliative care needs,( whose drug needs are quite critical).

In its simplest form, it involves the procurement of drugs from drug vendors without upfront payments. These drugs are dispensed with the proceeds paid into a dedicated account, and the suppliers are reimbursed weekly, while the stocks are being replenished. This ensures sustainable availability of essential medicines at the designated pharmacy outlets.

**1.1 AIMS AND OBJECTIVES OF THE STUDY**

1. To assess the effectiveness of the ZDRF in improving the availability, accessibility and sustainability of essential drugs to surgical, oncology and palliative care patients to strengthen their care in FMC Makurdi.
2. To evaluate the impact of ZDRF on quality of drugs dispensed to patients needing surgical, oncological and palliative care in FMC Makurdi.
3. To compare the impact of sustainable essential drugs availability in FMCM with the traditional DRF model which was in coma.
4. To evaluate the impact of ZDRF on pricing and affordability of essential

Drugs on patients needing surgical, oncology and palliative care in FMC Makurdi.

**1.2 Research Questions**

1. How effective is ZDRF in improving the sustainable availability and accessibility of drugs to surgical, oncology and palliative care patients in FMCM?
2. What is the overall impact of ZDRF on the affordability of drugs to surgical, oncology and palliative care patients in FMCM?
3. What is the impact of the ZDRF model on the quality of drugs assessed by surgical, oncology and palliative care patients in FMCM?
4. Does the ZDRF have any comparative advantage over the traditional DRF in terms of sustainable drug availability?

**2. Materials and Methods**

**2.1 Study area**

This study was carried out at FMCM Makurdi, Benue State, North Central Nigeria. Benue State has a population of over 6 million inhabitants who are unevenly spread over 23 local government areas. FMCM is one of the two tertiary hospitals in the state. It was upgraded from a General Hospital (secondary care) to FMCM (tertiary care) in 1995. A total of 100 respondents (50 each of staff and patients), participated in the study.

**2.2 Study Design**

This was a quantitative cross-sectional study that used questionnaires administered to patients at the surgical outpatient clinic, both outpatients/inpatients of oncology and palliative care units of FMCM. The aim was to evaluate the impact of the ZDRF on their care in terms of availability, accessibility, affordability and quality. The study was conducted over a period of six months, January to June, 2022.

**2.3 Sampling Method**

A simple random sampling method was employed in this study, which made it easier to reach out to patients and staff between the active working hours of 8 am to 4 pm. This sampling method enables us to obtain a representative subset of a larger population, therefore making the results more generalizable.

**2.4 Data Collection**

The primary data was collected using a self-developed, closed-ended structured questionnaires that were administered to two groups of respondents, hospital staff (especially pharmacists) and patients. Each set of questionnaire gave the respondent alternatives to answer based on a rating scale of 1-5 as follows:

1. Strongly disagree (70-75).
2. Disagree (75-80)
3. Neutral (80-85.
4. Agree (85-90)
5. Strongly agree (90-100).

Records of drug purchases and sales for during the study period and six months prior to study were collated from pharmacy and accounts departments were analyzed for comparison.

**2.5 Data Analysis**

The data was analyzed using SSPS through the Microsoft access platform. Chi-square test was deployed to make correlations with such variables as quality, availability, and pricing.

**2.6 Results**

This study was conducted to appraise the impact of the ZDRF scheme on the sustainable availability, accessibility, affordability, pricing and quality of essential medicines for surgical, oncology and palliative care patients at FMCM. A total of 50 respondents each of the staff of FMCM and patients were recruited using a simple random sampling approach. The results obtained from the self-administered questionnaires are presented below together with the interpretations.

**Socio-Demographic Characteristics**

|  |  |  |
| --- | --- | --- |
| Job cadre(staff) | Frequency | Percent (%) |
| Junior | 8 | 16.0 |
| Senior | 42 | 84.0 |
| Total | 50 | 100 |
| Ethnicity Patients |  |  |
| Idoma | 12 | 24.0 |
| Igede | 4 | 8.0 |
| Tiv | 22 | 44.0 |
| Others | 12 | 24.0 |
| Total | 50 | 100 |

Table. 1: Job Cadre and ethnic groups of participants

Fig. 1: Age Distribution of the study participants

Fig. 2: Percentage Distribution of the study participants by gender.

The study found that the majority, 76% and 74% of the study participants who were staff and patients of FMCM, and were of the age category 30-50yrs. 10% and 14% respectively of the staff and patients who participated in the study were less than 30 years, while 14% and 12% of the staff and patients were 50yrs and older [Fig.1]. While the majority (52%) of the patients who took part in the study were females, the majority (58%) of the staff are males **[Fig.2].** More than three-quarters (84%) of the FMCM staff who participated are of the senior cadre category, while just about 16% are of the junior cadre [**Table 1].** Lastly, it was also noted that the majority (44%) of the patients who participated in the study are of the Tiv ethnic origin, 24% of the Idoma and other ethnic categories, while just about 8% are of the Igede ethnic category **[Table 1].**

**Patients’ opinion of the Drug Distribution system**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | SD | D | N | A | SA |
|  | Freq(%) | Freq(%) | Freq(%) | Freq(%) | Freq(%) |
| I always by my prescribed drugs in FMC pharmacy | 10 (20) | 6 (12) | 9 (18) | 7 (14) | 18 (36) |
| The cost of buying drugs in FMC pharmacy is cheaper than buying from outside pharmacies | 7 (14) | 5 (10) | 10 (20) | 14 (28) | 14 (28) |
| The drugs dispensed at FMC pharmacy are good quality | 4 (8) | 1 (2) | 7 (14) | 26 (52) | 12 (24) |
| Patience recover faster after taking drugs purchased at FMC pharmacy than from outside pharmacies | 3 (6) | 6 (12) | 15 (30) | 12 (24) | 14 (28) |
| I am more satisfied with drugs purchased from FMC Pharmacy than from outside | 5 (10) | 9 (18) | 10 (20) | 15 (30) | 11 (22) |
| Drugs bought in FMC pharmacy is most times expired | 20 (40) | 13 (26) | 10 (20) | 3 (6) | 4 (8) |
| FMC pharm has good dispensary system | 6 (12) | 2 (4) | 5 (10) | 8 (16) | 29 (58) |

Table 2: patients’ opinion of the Drug Distribution system

The study found that the majority of the patients interviewed (50%) in the course of this study purchased their drugs at FMCM pharmacy outlets at the surgical, oncology and palliative care units. 32% of the patients claimed they bought their prescribed drugs elsewhere, while about 18% remained indifferent about whether they bought their drugs at the pharmacy or not. The study also found that three-quarters (76%) of the patients claimed the drugs dispensed are of good quality, while just about 10% doubted the quality of drugs dispensed at the surgical, oncology and palliative care outlets. More patients (52%) were found to be satisfied with the drugs purchased from the pharmacy outlets at FMCM compared to those who prefer buying their drugs from other pharmaceutical shops (28%) outside. Also the study found that, the majority of the patients interviewed disagreed with the fact that drugs bought over the canter from the pharmacy outlets at FMCM are most times expired.

Lastly, the study found from the opinion of the patients FMCM pharmacy outlets have a good dispensary system **(table 2,).**

**Staff opinion of the Drug Distribution system in FMCM**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | SD | D | N | A | SA |
|  | Freq(%) | Freq(%) | Freq(%) | Freq(%) | Freq(%) |
| Availability of Drugs | 1(2) | 7(14) | 7(14) | 13(26) | 22(44) |
| Quality of Drugs Supplied | 1(2) | 0(0) | 6(12) | 15(30) | 27(54) |
| The cost of supplying drugs at fmc is cheaper now | 5(10) | 16(32) | 14(28) | 8(16) | 6(12) |
| cost of selling drugs to patients at fmc is cheaper now | 5(10) | 18(36) | 12(24) | 8(16) | 7(14) |
| The demand for drugs by patients is high now | 2(4) | 1(2) | 3(6) | 23(46) | 21(42) |
| Drugs supplied to fmc pharmacy has a good on the shelf lifespan | 1(2) | 1(2) | 5(10) | 22(44) | 21(42) |
| Drugs supplied to FMC is of a higher quality | 0(0) | 0(0) | 13(26) | 15(30) | 22(44) |

Table 3: Staff opinion of the Drug Distribution system

Majority (70%) of staff were of the opinion that drugs are readily available at the pharmacy outlets of

FMCM, while about 16% of the staff indicated that drugs are not readily available at the pharmacy. Almost all the staff recruited for this study believed that the drugs supplied to the pharmacy outlets of the hospital were of good quality (Table 3). While the majority 46% of the staff disagreed with the fact that the cost of supplying drugs at FMCM under the ZDRF is cheaper, about 24% are indifferent, while just about 30% agreed with this fact. More than three-quarters (88%) of the staff claimed that the demand for drugs now is higher compared to what previously obtainable, while 86% of the recruited staff believed that the on-the-shelf life span of drugs now is better than what previously obtainable **(table 3).** Although about 26% were indifferent, 44% and 30% of the staffs who were part of the study were of the opinion that the drugs currently supplied to the FMCM pharmacy outlets are of high quality.

**Effectiveness of the Zero Capital DRF**

Fig. 3: The effectiveness of Zero Capital on DRF on a general note.

Fig. 4; Effectiveness of Zero Capital DRF in terms of drug quality

Fig. 5: Effectiveness of Zero Capital DRF in terms of drug supply even when suppliers are owed.

Fig. 6: Effectiveness of Zero Capital DRF in terms of drugs availability.

The study found that the majority of the staff of FMCM who took part in the study reported that so far, the ZDRF has been effective (31.9%) and very effective (40.4%) respectively **(Fig.3).**

When asked to rate the effectiveness of the ZDRF in terms of quality of the drugs supplied to the hospital, the majority of the staff claimed, it has been effective (44.7%) and very effective (31.9%) respectively **[Fig. 4].** They also claimed that the ZDRF has been effective (40%) when it comes to having to supply drugs without down payments (Fig. 5). Lastly, the study also found that the majority of the staff, claimed that the ZDRF has been effective (29.8%) and very effective (51.1%) respectively in making the drugs readily available [**Fig. 6].**

**Comparing collapsed traditional DRF model with the ZDR model at FMCM**

|  |  |
| --- | --- |
| **Month** | **Supply (N)** |
| July | 2,429,450.00 |
| August | 0 |
| September | 0 |
| October | 0 |
| November | 0 |
| December | 0 |
| **Total** | **2,429,450.00** |

*Table 4: Drugs supplied to traditional DRF scheme from July to December, 2021.*

|  |  |
| --- | --- |
| **Description** | **Stock Value** |
| Stock brought forward: | 3,180,759.96 |
| Stock supplied for the period | 2,429,450 |
| **Total** | **6,610,209.96** |

*Table 5: Total stock for the period of July to December, 2021.*

**.**

|  |  |
| --- | --- |
| **Month** | **Revenue (N)** |
| July | 3,419,141.00 |
| August | 618,662.00 |
| September | 429,031.00 |
| October | 1,681,904.00 |
| November | 2,414,162.00 |
| December | 2,262,783.00 |
| **Total** | **10,825,683.00** |

*Table 6: Revenue generated within the period of July to December, 2021.*

|  |  |
| --- | --- |
| Month | Supply (N) |
| January | 6, 119,930.00 |
| February | 6,760,690.00 |
| March | 6,385,945.00 |
| April | 18,596,985.00 |
| May | 17, 611,270.00 |
| June | 10, 596,050.00 |
| **Total** | **66,070,870.00** |

*Table 7: Drugs supplied under the DRF scheme from January to June, 2022.*

|  |  |
| --- | --- |
| **Description** | **Stock Value (N)** |
| Stock brought forward | 1,572,374.54 |
| Total stock supplied for the period | 66,070,870.00 |
| **Total** | **67,643,244.54** |

*Table 8: Total stock for the period of January to June, 2022*

|  |  |
| --- | --- |
| **Month** | **Revenue generated (N)** |
| January | 4,691,410.00 |
| February | 7,386,592.00 |
| March | 10,183195.00 |
| April | 12,314,935.00 |
| May | 10,998,320.00 |
| June | 13,074,530.00 |
| Total | 55,933,212.00 |

*Table 9: showing total revenue generated from January to June, 2022.*

**3. Discussion**

It is a consensus of opinion that, if DRFs are implemented in line with the Bamako initiative protocol, there will be sustainable availability of essential medicines across health care facilities that will be affordable, accessible, safe, and of high quality. This would considerably reduce out of pockets health care expenses which are catastrophically high. Similarly, while some countries have considerable progress in health insurance coverage, in some countries, it is still abysmally low to provide the protective risks for health care expenses.

Missing of drug doses by surgical, oncology and palliative care patients will have far reaching implications on their care, hence we decided to undertake this study to evaluate the impact of ZDRF on the sustainable availability of essential medicines which are affordable, accessible, safe, and of high quality. This would strengthen the quality of care among this group of critical and vulnerable patients.

**Impact of ZDRF on Drug Availability in FMCM**

**Table 10: Impact of Zero Capital DRF on Drug Availability**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Effectiveness of zero capital DRF | | | | | | | | | | | |
| Availability of Drugs |  | Not Very Effective | | Not Effective | | Unsure | | Effective | | Very Effective | | Total | |
| SD | 1 | 1.00 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 100.0% |
| D | 0 | 0.00 | 1 | 14.3% | 3 | 42.9% | 1 | 14.3% | 2 | 28.6% | 7 | 100.0% |
| neutral | 0 | 0.00 | 0 | 0.0% | 5 | 71.4% | 2 | 28.6% | 0 | 0.0% | 7 | 100.0% |
| A | 0 | 0.00 | 0 | 0.0% | 1 | 8.3% | 6 | 50.0% | 5 | 41.7% | 12 | 100.0% |
| SA | 0 | 0.00 | 1 | 5.0% | 1 | 5.0% | 6 | 30.0% | 12 | 60.0% | 20 | 100.0% |
| χ2=69.643, df=16, p=0.000 | | | | | | | | | | | | | |

The above contingency table **(table 10)** measuring the impact of ZDRF on drug availability at FMCM, showed a significant p-value of (x2=69.643, df =16, *P*=0.00). Therefore, the ZDRF significantly impacts the availability of essential drugs at FMCM. These findings agree with those of [17, 18 19,20].

**Impact of ZDRF on Drug Quality in FMCM**

**Table 11: Impact of Zero Capital DRF on Drug Quality**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Effectiveness of zero capital DRF | | | | | | | | | | | |
| Drug Quality |  | Not Very Effective | | Not Effective | | Unsure | | Effective | | Very Effective | | Total | |
|  | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| SD | 0 | 0.00 | 1 | 100.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 100.0% |
| D | 0 | 0.00 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| neutral | 0 | 0.00 | 0 | 0.0% | 3 | 50.0% | 2 | 33.3% | 1 | 16.7% | 6 | 100.0% |
| A | 1 | 0.07 | 0 | 0.0% | 5 | 35.7% | 4 | 28.6% | 4 | 28.6% | 14 | 100.0% |
| SA | 0 | 0.00 | 1 | 4.0% | 2 | 8.0% | 9 | 36.0% | 13 | 52.0% | 25 | 100.0% |
|  | χ2=33.163, df=12, p=0.01 | | | | | | | | | | | | |

**Table 11** above, measures the impact of a ZDRF model on the quality of drugs at FMCM during the study period. It showed a significant *P-value of (x2=33.163,df=12,P=001,* hence, ZDRF significantly impacts drug quality in the hospital.

The above findings conform to that of [21], who had earlier demonstrated that most patients accessing care at the hospital preferred DRF drugs because they perceive them as being safe, of high quality, and more acceptable. These findings of the impact of ZDRF on the quality of drugs at FMCM is in tandem with one of the main objectives of the National Drug Policy of Nigeria, 2005, which focuses on improving access to quality care, affordable medicines and promoting rational drug use within country. Similarly, the DRF scheme is a way to guarantee good quality drugs direct from manufacturers at affordable cost [22]

**Impact of ZDRF on the level of Patronage at** FMCM

**Table 12: Impact of Zero Capital DRF on the Level of Patronage**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Effectiveness of zero capital DRF | | | | | | | | | | | |
| Level of Patronage |  | Not Very Effective | | Not Effective | | Unsure | | Effective | | Very Effective | | Total | |
| 70-75 | 0 | 0.00 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 76-80 | 0 | 0.00 | 0 | 0.0% | 0 | 0.0% | 1 | 33.3% | 2 | 66.7% | 3 | 100.0% |
| 81-85 | 0 | 0.00 | 0 | 0.0% | 4 | 50.0% | 2 | 25.0% | 2 | 25.0% | 8 | 100.0% |
| 86-90 | 0 | 0.00 | 0 | 0.0% | 2 | 11.1% | 8 | 44.4% | 8 | 44.4% | 18 | 100.0% |
| 91-100 | 1 | 0.06 | 2 | 11.1% | 4 | 22.2% | 4 | 22.2% | 7 | 38.9% | 18 | 100.0% |
|  | χ2=12.057, df=12, p=0.44 | | | | | | | | | | | | |

**Table 12** above, measuring the impact of ZDRF on the level of patronage at FMCM, showed a significant p-value of (x2=12.057, df=12), *P*=0.44, it is therefore concluded that, ZDRF does not significantly influence the level of drug patronage at FMCM. This finding contrasts to that of [17], who demonstrated that the Bamako Initiative Drug revolving fund has positive correlation with the patronage of healthcare facilities in Iwajowa local government area of Oyo state, Nigeria. The low patronage in our case may be partly due to the fact that the study period fell within planting season, when most farmers are busy on the farms.

**Table 13: The Impact of ZDRF on the Cost of Drugs at FMCM**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Effectiveness of zero capital DRF | | | | | | | | | | | |
| Drug Quality |  | Not Very Effecrtive | | Not Effective | | Unsure | | Effective | | Very Effective | | Total | |
|  | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| SD | 0 | 0.00 | 1 | 20.0% | 3 | 60.0% | 1 | 20.0% | 0 | 0.0% | 5 | 100.0% |
| D | 0 | 0.00 | 1 | 6.3% | 2 | 12.5% | 7 | 43.8% | 6 | 37.5% | 16 | 100.0% |
| neutral | 0 | 0.00 | 0 | 0.0% | 2 | 16.7% | 5 | 41.7% | 5 | 41.7% | 12 | 100.0% |
| A | 0 | 0.07 | 0 | 0.0% | 2 | 28.6% | 2 | 28.6% | 3 | 42.9% | 7 | 100.0% |
| SA | 1 | 14.3% | 0 | 0.0% | 1 | 14.3% | 0 | 0.0% | 5 | 71.4% | 7 | 100.0% |
|  | χ2=21.717, df=16, p=0.153 | | | | | | | | | | | | |

**Table 13** above, measures the impact of ZDRF on the price of Drugs at FMCM, showing a significant p-value of (x2=*21.717, df=16), P=0.15*, it is therefore concluded that the ZDRF had no significant influence on the price of drugs within the hospital. These findings agree with those of [19],whoobserved in Khartoum that, the Revolving fund medicines were mostly considered affordable by users and only a fraction (6%), and were unable to procure the drugs because of financial reasons.

**4. Conclusion:**

Unavailability of essential drugs in many healthcare facilities especially in low-income countries is a recurrent decimal. It is a nightmare to healthcare providers and patients who access care at these facilities. Out of pockets expenses is high, health insurance coverage to absorb protective risks is low, with annual budgets allocation to health below the acceptable minimum. Healthcare providers continue to grapple with huge debts owed pharmaceutical companies. Many DRFs have collapsed and those surviving are unable to meet demands. Revenues continue to dwindle, the trust for replenishment of pharmaceuticals and other health consumables is lost between healthcare providers and pharmaceutical companies. There is a widening gap between what is needed and what is available.

With strong political will, strong commitment and disciplined financial management, the ZDRF model can effectively close this gap. It is a model that when, appropriately implemented, gives maximum benefit to patients and the hospital in terms of sustainable availability of essential drugs and increase revenue.

**4.1 Recommendation:**

The blanket application of a single model of DRF scheme may work perfectly in some climes, while it may not in others. Many DRFs schemes aren’t working or have collapsed due to a combination of factors. There is still a gap in knowledge as to what is the most effective DRF scheme model that works in each environment or region. Researchers must assess the peculiarities of their environments or regions, and develop a workable and functional DRF model that suites them, while at the same time continue to explore more on the suitability of the ZDRF scheme, especially in limited resource settings.

**Ethical Approval and consent**

Ethical approval was sought and obtained from the ethics committee of the hospital through a written application describing in details, the aim of the research, methodology and the data collection process. Besides, an informed consent was obtained from the patients and staff with assurance of outmost confidentiality to protect their right to privacy and data management.

Disclaimer (Artificial Intelligence, AI)

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing of this Manuscript

**REFERENCES**

1. Quick JD. (2003): Ensuring access to essential medicines in the developing countries: A framework for action, clinical pharmacology and therapeutics. 2003; 73:279-83.
2. World Health Organization. WHO. (2024): Essential Medicines. Available @ <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%221.%09Quick+JD.+%282003%29%3A+Ensuring+access+to+essential+medicines+in+the+developing+countries%3A+A+framework+for+action%2C+clinical+pharmacology+and+therapeutics.+2003%3B+73%3A279-83.%22&btnG=>
3. Hogerzeil, HV. (2004): The concept of Essential medicines: Lessons for rich countries. BMJ.2004; 329(7475):1169-72. Available @ <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%223.%09Hogerzeil%2C+HV.+%282004%29%3A+The+concept+of+Essential+medicines%3A+Lessons+for+rich+countries.+BMJ.2004%3B+329%287475%29%3A1169-72.+Available+%40+https%3A%2F%2Fdoi.org%2F10.1136%2Fbmj.329.7475.1169%22&btnG=>
4. Bazargani YT, Ewen M, de Boer A, Leufkens HG, Mantel-Teeuwisse AK, (2014): Essential Medicines are more available than other medicines around the globe. pLoS one. 2014; 9(2):e87576. Available @ hhtps://doi.org/10.1371/journal.pone.0087576

(<https://doi.org/10.4103/0970-0218.164382>). <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%224.%09Bazargani+YT%2C+Ewen+M%2C+de+Boer+A%2C+Leufkens+HG%2C+Mantel-Teeuwisse+AK%2C+%282014%29%3A+Essential+Medicines+are+more+available+than+other+medicines+around+the+globe.+pLoS+one.+2014%3B+9%282%29%3Ae87576.+Available+%40+hhtps%3A%2F%2Fdoi.org%2F10.1371%2Fjournal.pone.0087576%22&btnG=>

1. Maiti R, Bhatia V, Padhy BM, Hota D, (2015): Essential Medicines: An Indian perspective. Indian J Community Med. 2015; 40(4):223-32. Available @ (<https://doi.org/10.4103/0970-0218.164382>). <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%225.%09Maiti+R%2C+Bhatia+V%2C+Padhy+BM%2C+Hota+D%2C+%282015%29%3A+Essential+Medicines%3A+An+Indian+perspective.+Indian+J+Community+Med.+2015%3B+40%284%29%3A223-32.+Available+%40+%28https%3A%2F%2Fdoi.org%2F10.4103%2F0970-0218.164382%29%22&btnG=>
2. Quick J, Hogerzeil H, Velasquez G, Ragol L (2002): Twenty-Five years of essential medicines: Bull World Health Organization, 80(11). 913-914. January 2002. <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%226.%09Quick+J%2C+Hogerzeil+H%2C+Velasquez+G%2C+Ragol+L+%282002%29%3A+Twenty-Five+years+of+essential+medicines%3A+Bull+World+Health+Organization%2C+80%2811%29.+913-914.+January+2002%22&btnG=>
3. Cameron A, Ewen M, Ball D, Laing R, (2009): Medicines prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis: Lancet 373(9659).240-249, Feruary 2009. <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%227.%09Cameron+A%2C+Ewen+M%2C+Ball+D%2C+Laing+R%2C+%282009%29%3A+Medicines+prices%2C+availability%2C+and+affordability+in+36+developing+and+middle-income+countries%3A+a+secondary+analysis%3A+Lancet+373%289659%29.240-249%2C+Feruary+2009.%22&btnG=>
4. Africa CDC (2025); Africa’s Health Financing in New Era. Available @

<https://africacdc.org/download/africas-health-financing-in-a-new-era-april-2025/>

1. WHO: Global Health expenditure Database (WHO, 2023). Available @ <https://apps.who.int/nha/database>
2. World Bank. 1994. The importance of Pharmaceuticals and drug Programs. In: Better Health in Africa: Experience and lessons learned. Washington Dc: World Bank. Available @ <https://library.au.int/frbetter-health-africa-experience-and-lessons-learned-4>
3. Umenai T, Narula, I.S. (1999). Revolving drug funds: a step towards health security: In: Bulletin of the World Health Organization; Bull World Health Organ. 1999; 167-171. World Health Organization. <https://iris.who.int/handle/10665/2677/267782>. <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%229.%09Umenai+T%2C+Narula%2C+IS+%281999%29%3A+Revolving+drug+funds%3A+A+step+towards+health+security%3A+Bulletin+of+the+WHO.+1999%3B+77%282%29%3A+167-71.+PMID%3A10083717%22&btnG=>
4. Jibrailu L. Maliyogbinda (2024): Commodity Security: The Role of Drug Revolving Fund Scheme in Low- and Middle-Income Countries, In book: Global Health Security-Contemporary Considerations and developments. Available @ <https://www.researchgate.net/publication/381605519_Commodity_Security_The_Role_of_Drug_Revolving_Fund_Scheme_in_Low-_and_Middle-Income_Countries>

DOI: 10:5772/intechopen.112790

1. Businessday Nigeria newspapers (June 22, 2025): Pharmacists allege N30bn debt in pharma industry due to mismanagement of health funds: Businessday Nigeria: available @ <https://businessday.ng/news/article/pharmacists-allege-n30bn-debt-in-pharma-industry-due-to-mismanagement-of-health-funds/?amp>
2. Blueprint newspapers Nigeria (March 11, 2020); NHIS: 46 HMOs owe National Hospital 520m-Official: Blueprint Newspapers Nigeria, March, 11, 2020. Available @ <https://blueprint.ng/nhis-46-hmos-owe-national-hospital-n520m-official/>
3. Anyakora C, Odebili (2002, February 7): Drug Revolving Fund in Africa: A step towards health security. Businessday newspapers. Available @ businessday.ng/opinion/article/drug-revolving-fund-in-africa-a-step-towards-health-security/
4. Ohaju-Obodo J.O, Ighedosa, S.U, Asalu A.F, Okoli R.I, Omokafe A.A, (2006). An evaluation of the Drug revolving Fund (DRF) Scheme in Nigeria; two decades after its adoption: Archives of Clinical Research Volume 1 December, 2006. Available @

<https://www.researchgate.net/publication/361217758_An_evaluation_of_the_Drug_Revolving_Fund_DRF_Scheme_in_Nigeria_two_decades_after_its_adoption>

1. Abegunde KA, Asuzu MC, (2014): Facility User’s preference between the free and Bamako Initiative (Drug revolving fund-based) health services in Iwajowa local government , Oyo State: Journal of Community medicine and Primary Health Care 26(2) 1-6, 2014 <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%2215.%09Abegunde+KA%2C+Asuzu+MC%2C+%282014%29%3A+Facility+User%E2%80%99s+preference+between+the+free+and+Bamako+Initiative+%28Drug+revolving+fund-based%29+health+services+in+Iwajowa+local+government+%2C+Oyo+State%3A+Journal+of+Community+medicine+and+Primary+Health+Care+26%282%29+1-6%2C+2014%22&btnG=>
2. Ogbonna BO, Nwankwo C, (2016): Essential Drugs Revolving Scheme in Nigeria; From the Edge of a precipice towards sustainability: Journal of Advances in Medical and Pharmaceutical Sciences 8(2): 2016, Article no. JAMPS.25950. available @ https://scholar.google.com/scholar?hl=en&as\_sdt=0%2C5&q=%2216.%09Ogbonna+BO%2C+Nwankwo+C%2C+%282016%29%3A+Essential+Drugs+Revolving+Scheme+in+Nigeria%3B+From+the+Edge+of+a+precipice+towards+sustainability%3A+Journal+of+Advances+in+Medical+and+Pharmaceutical+Sciences+8%282%29%3A+2016%2C+Article+no.+JAMPS.25950.+available+%40+www.sciencedomain.org%22&btnG=
3. Ali GKM, (2009): How to build a successful revolving drug fund: the experience of Khartoum state in Sudan: Bulletin of the World Health Organization, 87 (2). 139-142, 2009. Available @ <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%2217.%09+Ali+GKM%2C+%282009%29%3A+How+to+build+a+successful+revolving+drug+fund%3A+the+experience+of+Khartoum+state+in+Sudan%3A+Bulletin+of+the+World+Health+Organization%2C+87+%282%29.+139-142%2C+2009.+Available+%40+www.scielosp.org%22&btnG=>
4. Benjamin SC Uzochukwu, Obinna E Onwujekwe, Cyril O Akpala (2002): Effect of Bamako-Initiative drug revolving fund on the availability and rational use of essential drugs in primary health care facilities in south-east Nigeria: HEALTH POLICY AND PLANNING; 17(4): 378-383. <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%2218.%09+Benjamin+SC+Uzochukwu%2C+Obinna+E+Onwujekwe%2C+Cyril+O+Akpala+%282002%29%3A+Effect+of+Bamako-Initiative+drug+revolving+fund+on+the+availability+and+rational+use+of+essential+drugs+in+primary+health+care+facilities+in+south-east+Nigeria%3A+HEALTH+POLICY+AND+PLANNING%3B+17%284%29%3A+378-383%22&btnG=>
5. Oseni YO, Afolabi O, (2014): Comparing analysis of drug revolving fund (DRF) and Public Private Partnership (PPP) program on drug supply management in University College Hospital (UCH): West African Journal of Pharmacy, 2014. Available @ <https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=%2219.%09Oseni+YO%2C+Afolabi+O%2C+%282014%29%3A+Comparing+analysis+of+drug+revolving+fund+%28DRF%29+and+Public+Private+Partnership+%28PPP%29+program+on+drug+supply+management+in+University+College+Hospital+%28UCH%29%3A+West+African+Journal+of+Pharmacy%2C+2014.+Available+%40+https%3A%2F%2Fwww.wacpcjournal.org.ng+%22&btnG=>
6. Brian O. Ogbonna, Amobi L. Ilika, Achunam Nwabueze (2015). NATIONAL DRUG POLICY IN NIGERIA, 1985-2015: World Journal of Pharmaceutical Research 4(6)248-265. Available @ [www.researchgate.net/publication/277557398\_NATIONAL\_DRUG\_POLICY\_IN\_NIGERIA\_1985-2015](http://www.researchgate.net/publication/277557398_NATIONAL_DRUG_POLICY_IN_NIGERIA_1985-2015)