**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:** The aim of this study is to assess the effectiveness of the zero drug revolving fund in improving the sustainable availability, accessibility, and affordability of high quality essential medicines, especially to surgical, oncology and palliative care patients in FMCM.

**Method:** The study was conducted at FMCM, a tertiary health Institution with a population of over six million. Open-ended questionnaires were administered to 100 respondents, 50 each of Staff of FMCM and Patients. The response rate was 100%.

**Study Design:** This was quantitative cross-sectional study with open-ended questionnaires administered to patients of surgical, oncology, and palliative care units at FMCM, over a period of six months (Jan-Jun, 2022).

**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.

**Results:** The study found that the zero capital drug revolving fund significantly improves the sustainable availability of essential medicines at federal medical center makurdi*, P=*0.000. The study also demonstrated that zero capital DRF drugs were of high quality*, P=0.001*. However, it was noted that the zero capital DRF had no significant level of drug patronage in the hospital*, P=0.44*. Similarly, the zero capital DRF 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, while the revenue for corresponding period of zero capital DRF 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 handy 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, 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]

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) [8].

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 [9].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 [10]. 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 [11**].** 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 [12].

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 [13].It is essentially a matter of political will, for instance, in kano State, Nigeria, the DRF is a remarkable success. It has expanded significantly from 60 to 890 healthcare facilities in Kano over 17 years, with more than 80% availability of commodities [14].

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, oncological 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 care, oncological 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/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 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**

Simple random sampling was employed in this study. This method made it quite easy to reach out to staff and patients especially during working hours. It also eliminates bias as much as possible and produces a generalizable result.

**2.4 Data Collection**

The primary data was collected using a closed-ended structured questionnaires that were administered to two groups of respondents, hospital staff (especially pharmacists) and patients. A total of 50 respondents each of the staff of FMCM and the patients were recruited. Each set of questionnaire gave the respondents alternative to answer based on a rating scale of 1-5.Records at the pharmacy department for the preceding 6 months prior to commencement of ZDRF were reviewed to be able to make a comparison. Secondary data was from peer-reviewed journals.

**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 Ethical Considerations**

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. Similarly, an informed consent was obtained from the patient through a short communication addressed to the respondents on the cover page of the questionnaires which assured them that the research was purely for academic purpose, and their confidentiality protected.

**2.7 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: showing 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 of FMCM and patients of the same hospital 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 are 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 purchase their drugs at FMCM pharmacy outlets at the surgical, oncology and palliative care units. 32% of the patients claimed they buy their prescribed drugs elsewhere, while about 18% remained indifferent about whether they buy 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**

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 it used to be, 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.*

**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 risk for health care expenses.

The vulnerability of surgical, oncology or palliative care patients missing their doses will be catastrophic, hence we decided to undertake this study to see whether the ZDRF will lead to 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 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 [15, 16, 17,18].

**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 [19], who 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 the 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 [20]

**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 [15], 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 partly be due to the fact 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**

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**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 the findings of [17],observed 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.

The sustainable availability of essential medicines across healthcare facilities in sub-Saharan African countries has become a major challenge that is affecting quality healthcare delivery, especially as it affects surgical, oncology and palliative care patients. Health care institutions continue to struggle with huge debts owed to drug suppliers and have lost the trust for any replenishment by those drug vendors. Many of the DRFs are non-functional or have collapsed, and there isn’t available any seed money to resuscitate them.

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.

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