

Effect of the Bamako-Initiative drug revolving fund on availability and rational use of essential drugs in primary health care facilities in south-east Nigeria

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Objectives: To compare the level of availability and rational use of drugs in primary health care (PHC) facilities where the Bamako Initiative (BI) drug revolving fund programme has been operational, with PHC centres where the BI-type of drug revolving fund programme is not yet operational.

Methods: The study was undertaken in 21 PHC centres with BI drug revolving funds and 12 PHC centres without BI drug revolving funds, all in Enugu State of Nigeria. Data were collected on the essential and non-essential drugs stocked by the facilities. Drug use was determined through analyses of prescriptions in each health centre. Finally, the proportion of consumers that were able to remember their dosing schedules was determined.

Findings: An average of 35.4 essential drugs was available in the BI health centres compared with 15.3 in the non-BI health centres ($p < 0.05$). The average drug-stock was adequate for 6.3 weeks in the BI health centres, but for 1.1 weeks in non-BI health centres ($p < 0.05$). More injections (64.7 vs. 25.6%) and more antibiotics (72.8 vs. 38%) were prescribed in BI health centres than in the non-BI health centres ($p < 0.05$). The BI health centres had an average of 5.3 drugs per prescription against 2.1 in the non-BI health centres. However, the drugs prescribed by generic name and from the essential drug list were higher in the BI health centres (80 and 93%) than the non-BI health centres (15.5 and 21%, respectively) ($p < 0.05$).

Conclusion: It was observed that the BI facilities had a better availability of essential drugs both in number and in average stock. However, the BI has given rise to more drug prescribing, which could be irrational. The findings call for strategies to ensure more availability of essential drugs especially in the non-BI PHC centres as a strategy to decrease medical costs and improve the quality of PHC services, while promoting rational drug use in all PHC centres. More detailed studies (for example, by focus group discussion or structured interviews) should be undertaken to find out reasons for the over-prescription and to develop future interventions to correct this.

Key words: Bamako Initiative, essential drugs, rational use, prescribing practice, primary health care, Nigeria

Introduction

Nigeria has been one of the most active supporters of the Bamako Initiative programme (BI), viewing the initiative as a strategic opportunity to support local governments in strengthening the provision of primary health care (PHC) (Federal Ministry of Health 1990). The country adopted the programme in 1988 with financial and technical support from the World Health Organization (WHO), United Nations Children's Fund (UNICEF) and the UK Department for International Development (DFID) (Federal Ministry of Health 1994). The BI aims to ensure a steady supply of the most basic essential drugs, prescribed under generic names, at affordable prices and at the same time improving prescribing practices (Federal Ministry of Health 1994). The drug-revolving fund mechanism within the BI framework was

adopted as the initial approach for sustainable financing of drug supply at the local level. The BI was subject to widespread criticism at its inception (Chabot 1988; *The Lancet* 1988; Garner 1989; Kanji 1989), and one of the areas identified by those who prefer a need-determined basis for policy making was an overemphasis on drugs relative to other components of the health delivery system. They argued that linking finance with drug supply may reinforce an undesirable emphasis on drugs in the mind of both patients and community health workers. Concern was also expressed at the potential impact of the rational use of drugs (*The Lancet* 1988).

The case for the use of a generic essential drug list in BI is supported by the fact that 'the costs of medications are lower where generic drugs, on the essential drugs list, are used'

(Ait-Khaled et al. 2000). In many African countries, the first step for introducing a new drug is its selection on the essential drug list according to need, the efficacy, the safety and the affordability of the product (Salako 1998). The concept of an essential drug list, as proposed by WHO, is that the list should comprise drugs corresponding to the health needs of the majority of the people. Essential drug lists have been embraced by many countries, which have adapted the WHO model list to their needs (Fasehun 1999). However, in many instances, 'lack of availability of essential drugs forms a problem for the treatment of diseases that predominantly affect the developing world' (Pecoul et al. 1999).

The availability of drugs is one of the most visible symbols of quality care to consumers. In Nigeria, patients' visits dropped by 50–75% when health facilities ran out of commonly used drugs (World Bank 1994). In Uganda, inadequacy of formal health services was perceived by users to be partly due to understaffing and to irregular supply of essential drugs (Ndyomugenyi et al. 1998). Regular availability of drugs in health-care facilities is a basic component of a well-functioning health system from the perspective of policy makers and providers. It has been shown that cost recovery accompanied by a fair supply of essential drugs and by better-motivated staff improved the efficiency of the health system in Cameroon (Audibert and Mathonnat 2000).

Though ensuring a regular supply of essential affordable drugs improves the quality of care and the attendance at peripheral health facilities (Litvack and Bodart 1993), the rational use of the drugs is a major concern. The rational use of drugs is potentially more problematic at lower levels of the health services like the PHC centres where supervision and controls even in the best of conditions are less rigorous. Poor prescribing practices often result in the inappropriate use of drugs. The source of irrational use may come from the prescriber (Laing 1990; Gilson et al. 1993; Hogerzeil et al. 1995) or the consumer (Greenhalgh 1987; Hardon 1987). Inappropriate prescribing practices by health workers encourage inappropriate self-medication (Greenhalgh 1987).

The aim of this study therefore was to assess the availability of essential drugs and the use of these drugs in BI facilities and to compare these practices with the practices in non-BI PHC centres. Various studies that have evaluated the BI programme have focused particularly on the community financing and community participation aspect (McPake et al. 1993; Ogunbekun et al. 1996; Ogundeji 1997). Surprisingly little is known regarding the availability of essential drugs and their rational use in areas where the BI has been/is being implemented, bearing in mind that drug supply and use are among the major pillars of the scheme. This information is necessary for modifications or scaling-up of the BI for improved drug availability and use of affordable essential drugs.

Materials and methods

The study areas were Oji River local government area (LGA), where the BI programme had been implemented, and Enugu East LGA, where the BI programme has not been

implemented. They are both in Enugu state, south-east Nigeria, and are 50 km apart. Oji River LGA is located 40 km south of Enugu, the state capital, with a projected population for 1997 of 98 465. The area is predominantly rural with subsistence farming as the major occupation. It has 21 PHC centres, two government owned hospitals, one mission and 10 privately owned hospitals. Enugu East LGA is located 10 km north of Enugu, with an estimated population of 150 000 and it has 12 PHC centres. The health centres in both areas are stratified into three groups of high, medium or low level of infrastructural development. Oji River LGA has 14 high, five medium and two low level PHC facilities, while there are six high, two medium and four low-level PHC facilities in Enugu East LGA. The high-level centres have beds for maternity care. The number of health workers in the centres range from 3–15 with the high-level ones having more workers than the other centres. All the centres have drug-dispensing units and kept good patient records for at least 6 months preceding the survey.

Oji River LGA started implementing the BI programme in 1993 and to facilitate the take-off of the programme in the LGA, the Federal Ministry of Health (FMOH), through the National Primary Health Care Development Agency (NPHCDA) supplied the LGA with a seed stock of drugs. A 1-week orientation course on all the operational aspects of the programme was given to PHC workers, including the need for adequate drug availability and rational drug use. In addition, the LGA built and secured adequate drugs storage facilities at the LGA administrative headquarters and established a drug revolving fund system, a precondition for admission into the programme.

Retrospective and cross-sectional methods were used to collect data from all the 33 primary health centres. The data collected included listing the availability of all drugs in stock at the time of visit. These were categorized into essential and non-essential drugs using the essential drug list of 1996, approved by FMOH for use at the health centres (Federal Ministry of Health 1996), as the criterion. Drugs were considered essential if the FMOH or the BI had placed them on the list for use in health centres and non-essential if they were not on either list.

The quantity of drugs in stock was recorded for 13 'marker' drugs that were determined, prior to the survey, as the most commonly used in health centres from interviews with the providers. These drugs were chloroquine, metronidazole, cotrimoxazole, procain benzyl penicillin injection, acetyl salicylic acid, oral re-hydration salts, pyrantel, tetracycline eye ointment, benzyl benzoate, Whitfield ointment, intravenous fluid, antacid and iron/folic acid. The quantities of these drugs were expressed as the estimated duration for which the stock would be adequate to cover the expected consumption. The estimate was based on average monthly consumption for each health unit for each drug.

Prescription analysis to determine the average number of drugs per prescription was employed (WHO 1993). Another method used to investigate the nature of drug provision was the percentage of prescriptions with antibiotics and injections. The prescription data were collected from the

prescription cards of the last 50 patients in each of the 31 health facilities in programme and control areas irrespective of whether they were new or old cases. The cards were routinely retained at each facility and the required data were available on all the cards.

For each of the prescriptions, the variables collected were the average number of drugs prescribed per encounter, average percentage of prescriptions with injections, the average percentage of prescriptions with one or more antibiotics, the percentage of generic prescribing and percentage of prescriptions with essential drugs. These indicators have standardized definitions and facilitate quick and reliable assessment of drug use in health centres (WHO 1993; Hogerzeil et al. 1995).

Another variable examined was the percentage of people who were able to remember their dosing schedules. This was assessed by interviewing 10 patients per facility for 30–60 minutes after they had left a PHC facility. A total of 330 exit polls interviews were conducted. Six medical students, who were trained for 2 days in data collection, collected the data from March to May 1999, under the supervision of the authors.

Ethical clearance for the study was obtained from the ethical committee of the University of Nigeria Teaching Hospital Enugu, while consent was sought from the Head of the Health Department of each LGA. For the exit interview, verbal consent was sought from the respondents after the objectives of the study were explained to them. Those who consented were then interviewed in one of the rooms in the facility concerned. Data were cleaned and analyzed, and a significance level of $p < 0.05$ was chosen. Double data entry was done by two data entry clerks into the Epi-Info software version 6.04 (CDC/WHO) and later merged. Data analysis was undertaken using the Epi-Info 6.04 software. Student's *t*-test was used to analyze continuous variables and the χ^2 -test for categorical variables. The unit of analysis was the facility and not the prescription. This is in accordance with the WHO manual (WHO 1993).

Results

Drug availability

Table 1 presents the results of assessment of availability and use of drugs in BI and non-BI facilities, using the facilities as

the basis of the analysis. The table shows that an average of 35.4 essential drugs (ED) were available in the BI health centres compared with 15.3 essential drugs in the non-BI health centres out of a possible total of 39 EDs required at the health centre level. The difference between the two types of health centres was statistically significant ($p < 0.05$). In the BI programme area, the average number of non-essential drugs available was 1.2 compared with 20.2 in the non-BI health centres ($p < 0.05$). Table 1 also shows that the BI programme areas stocked an average of 6.3 weeks' supply of the 13 marker drugs while the non-BI health centres had only 1.1 weeks supply ($p < 0.05$).

Drug use

The average number of drugs per prescription was 5.3 and 2.1 for BI and non-BI areas, respectively ($p < 0.05$) (Table 1). The average percentage of prescriptions with injections was 64.7 and 25.6% for the BI and non-BI health centres, respectively. Also the average percentage of prescriptions with one or more antibiotics was 72.8 and 38%, respectively, for BI and non-BI areas ($p < 0.05$). In the BI health centres, the percentage of drugs prescribed by generic name (generic prescribing) and prescription with essential drugs was 80 and 93%, respectively, compared with 15.5 and 21%, respectively, in the non-BI health centres.

Patients' understanding

Out of the 330 respondents interviewed at the exit polls, 12% were aged less than 20 years, 70% were between 21–40 years and 18% were aged above 40 years. All of them were females. While 5% had no formal education, 66% had only primary education and 29% had secondary education and above. Two hundred and six (62%) of the respondents came to the clinic because of their child's health care, 35 (11%) visited because of their own health care and 89 (27%) visited both for their own and their child's health care.

Table 2 shows that about 76% in the BI programme area and 94% in the non-BI area remembered the dosing schedule when only one drug was dispensed. Of those that were dispensed with two items, 61% in the BI area and 75% in the non-BI area remembered their dosing schedule, and when three or more items were dispensed, 25% of patients in the BI area and 32% in the non-BI area remembered their

Table 1. Availability of drugs and prescription practices in primary health care centres

Indicators	BI facilities (n = 21)	Non-BI facilities (n = 12)	p-value
Average number of essential drugs available	35.4	15.3	$p < 0.05$
Average number of non-essential drugs available	1.2	20.2	$p < 0.05$
Average stock of 13 marker drugs (in weeks)	6.3	1.1	$p < 0.05$
Average number of drugs per prescription	5.3	2.1	$p < 0.05$
Average percentage of prescriptions with injections	64.7%	25.6%	$p < 0.05$
Average percentage of prescriptions with one or more antibiotics	72.8%	38%	$p < 0.05$
Percentage of drugs prescribed by generic name	80%	15.5%	$p < 0.05$
Percentage of prescriptions with essential drugs	93%	21%	$p < 0.05$

Table 2. Patients remembering their dosing schedule in BI and non-BI areas

Indicators	BI area	Non-BI area	p-value
One item	76% (41/54)	94% (28/30)	p > 0.05
Two items	61% (39/64)	75% (49/65)	p > 0.05
Three or more items	25% (23/92)	32% (9/27)	p > 0.05
χ^2 for trend	p < 0.05	p < 0.05	

dosing schedule. Fisher's exact test showed that in the three instances, there were no statistically significant differences between BI and non-BI patients in remembering dosing schedules ($p > 0.05$). The trends of decreasing percentages of patients who were able to remember their dosing schedules as numbers of items dispensed increased for both areas were statistically significant in both areas ($p < 0.05$). There was no relationship between educational level and remembering dosing schedule ($p > 0.05$).

Discussion

The findings show that the BI drug revolving fund programme had a positive effect on availability of essential drugs in PHC facilities when compared with non-BI PHC facilities. Such mechanisms in the BI as the use of essential drug lists, generic prescribing and training in rational prescribing are strategies that have been proposed by various organizations and governments for rationalizing the use of drugs in developing countries (Garraoui et al. 1999). Thus, the better performance of the BI PHC centres in relation to drug availability in this study supports some of the expectations of the policy makers in the programme design.

The fact that most of the drugs in the BI health centres were on the essential drug list, compared with the fewer numbers in the non-BI health centres, implies that cost-savings for the provider would be better achieved under the BI system. However, because the BI facilities prescribed 5.3 drugs on average, the total cost of a prescription is likely to be higher in BI than in non-BI facilities (average of 2.1 drugs), and may therefore cancel the cost savings to consumers arising from the better availability of essential drugs. Using an average of 5.3 drugs per prescription and 73% of prescriptions with one or more antibiotics is clearly irrational and wasteful. This finding has also been noted elsewhere (Hogerzeil et al. 1995). A costing study using retrospective data to give a clearer indication of the average cost per prescription is recommended.

Stock levels of essential drugs show that both the range and average stock availability of essential drugs was greater in the BI health centres. However, the finding of some non-essential drugs in the BI health centres suggests that either the BI centres were not adhering to the drug selection and purchase procedures, or that these drugs were privately purchased by health workers for private sales at the health centres. This is a problem that needs further investigation.

It was apparent that the availability of drugs directly affects prescribing patterns since there was over-prescription in BI health centres. Drugs were apparently prescribed according to which drugs were available at the health centre and not necessarily according to patient needs. However, it is possible that the health workers were influenced by the demand of patients, as has been found elsewhere (Nichter 1989; Mynika and Killewo 1991).

A greater proportion of drugs were prescribed by generic name and from the essential drug list in the BI health centres compared with non-BI health centres. Nevertheless, the lower number of drugs, antibiotics and injections per prescription in the non-BI health centres may not necessarily be due to better knowledge of prescribing practice among health workers in these non-BI health centres. It could be due to inadequate supply of drugs in that area, which limited the number of drugs the health workers could prescribe, or mis-prescribe.

Excessive prescription of drugs is often a serious problem, especially the inappropriate use of antibiotics that can predispose to the development of drug-resistance by microorganisms. Also, the widespread abuse of injections causes concern about the transmission of infectious disease such as HIV, hepatitis and Poliomyelitis (Wyatt 1984; Michel 1985; Reeler 1990). Also, losses from irrational drug prescriptions have been estimated to reduce drugs availability by 50% (WHO 1993b). In the BI scheme, finance is linked with drug supply and part of the proceeds of drug sales is used for health workers' remuneration. This practice may encourage over-prescription when drugs are available, in an attempt to make more money from the sale of drugs. We suspect this was the case in BI facilities. Furthermore, in some cases, the consumers' perception of expertise of health workers is linked to their prescribing rate and the greater the number of drugs prescribed, the higher the perceived expertise of the health worker. However, this may not be peculiar to the BI alone, but apply to general health care services.

Evidence also exists in Nigeria that health personnel tend to embark on poly-pharmacy in their attempts to treat a number of possible diseases simultaneously (World Bank 1992). In other countries, high numbers of drugs per prescription in both public and private sectors have been found (Falkenberg et al. 2000). To solve the problem of over-prescription, some authors have recommended just two drugs per prescription (Kshirsagar et al. 1998) and that justification for prescribing more drugs than this should be required because of the increased risk of drug interactions (Nes 1990). However, arbitrary caps on prescribing have been shown to have adverse effects on outcomes in US patients (Soumerai and Ross-Degnan 1999).

The percentage of patients remembering their dosing schedules decreased significantly as the number of items increased. The confusion in the dosing schedule may be related to workload or lack of appropriate counselling of the patients by the health workers, some of whom may not have had any training in BI operations. There was no relationship between educational level and remembering of dosing

schedule. This finding would suggest that future strategies to improve rational drug use should include promoting the use of one or two items, maybe as combined therapies, as opposed to more than two or three items sometimes recommended in standard drug treatment schedules. Pre-packaging of drugs in easily understandable doses is another possibility for improving both compliance and dispensing practices (Ansah et al. 2001). The use of pictorial inserts could also improve compliance and dispensing practices (Okonkwo et al. 2001). However, there was no overall significant difference between respondents attending the BI health centres and non-BI health centres in remembering their dosing schedules. This suggests that there were other factors, apart from the number of items, that influenced patients' ability to remember dosing schedules.

In summary, the BI facilities had a better availability of essential drugs both in number and in average stock availability. However, there is compelling evidence that the drugs are not being prescribed optimally by the health workers in BI facilities. Thus, it is not enough to make drugs available, but continuous strategies to increase the rational use of drugs should be part of strengthening the BI scheme. More detailed studies (e.g. by focus group discussions or structured interviews) should be undertaken to find out what the reasons are for the over-prescription and to develop future interventions to correct this serious problem. Drugs will be better used in an approach that includes better regulatory frameworks, standard treatment schedules, training and supervision to avoid over-prescription and to ensure rational use (Laing et al. 2001).

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