Original Article

Affordability of Antipsychotic Medications of Respondents Who are Being Managed for Schizophrenia in Benin City

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ABSTRACT

Introduction: The consequences of expensive antipsychotics medication can be two folds. One, patients can become more impoverished due to the spending of limited financial resources on the procurement of antipsychotics. Second, the high cost of antipsychotics maybe discouraging and therefore lead to poor adherence and therapeutic failure. The objective was to determine the levels of impoverishment, catastrophic expenditure and the number of days the least paid government worker will have to work due to out-of-pocket (OOP) payments of antipsychotics in a sample of patients receiving treatment for schizophrenia in Benin City.
Methods: A community-based cross-sectional survey amongst respondents who are being managed for schizophrenia was conducted using a two-stage cluster sampling procedure. Outcome measures were poverty headcount ratio, poverty gap, catastrophic expenditure and the number of days the least paid government worker will have to work due to OOP payments for antipsychotics.
Results: Schizophrenics receiving olanzapine, risperidone, haloperidol, trifluoperazine or chlorpromazine medication to manage their psychiatric condition are being further impoverished by 11.1%, 7.4%, 3.7%, 3.7% and 1.9%, respectively, at the risk of catastrophic expenses by 70%, 64%, 28%, 28% and 34%, respectively, while that of number of days the least paid government worker will have to work to get their drugs were 1.8 day, 1.35 day, 0.15 day, 0.15 day, 0.21 day, respectively.
Conclusion: Antipsychotics such as olanzapine and risperidone are far less affordable than chlorpromazine, haloperidol and trifluoperazine.

Key words: Affordability, antipsychotics, catastrophic, impoverishment, pharmacoeconomics

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INTRODUCTION

A commodity is obviously unaffordable if it cost more than what is in the full or potential budget.[1] The cost of living is the amount of money needed to sustain a certain standard of living by affording basic expenses such as housing, food taxes and healthcare thus affordability is closely related to cost of living.[2]

There are three known approaches of determining the affordability of commodity namely catastrophic, impoverishment and the World Health Organisation (WHO)/Health Action International (HAI), all of which have their strengths and weaknesses.[3-5]

Catastrophic health expenditure is defined as out-of-pocket (OOP) spending for healthcare that exceeds a certain proportion of a household's income with the consequence that those households may suffer the burden of the disease.[6] OOP payments are defined as direct payments made by individuals to health-care providers at the time of service use.[6] The threshold for health expenditure is arguably 10% while that of medication expenditure should consume half of the health expenditures.[1]

Impoverishment method determines the proportion of populace (sample) that has been made poor as a result of the purchase of a commodity,[1,6] while that of WHO/HAI measures the affordability of medications by the number of days the least paid government worker will have to work.[2]

Affordability of antipsychotics is very crucial as it has a way of influencing the standard of living of schizophrenics as well as

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their quality of life.[7,8] Antipsychotic medications are indicated amongst others for the management of Schizophrenia.[9,10] Schizophrenia is a psychiatric condition characterised with delusions, hallucinations, disorganised speech, disorganised or catatonic behaviour and negative symptoms.[11]

Schizophrenia is a major cause of disability, with active psychosis ranked as the third-most disabling condition after quadriplegia and dementia and ahead of paraplegia and blindness. The risk of not managing schizophrenia increases disability by more than 25%, more work, and marital disruption, financial problems, crime, mortality compare to population without the psychiatric condition.[12-14] The average life expectancy of people with schizophrenia is lower than would be expected for the population as a whole.[14]

The Gross Domestic Product per capita (which tells how prosperous a country feels to each of its citizens) in Nigeria was last recorded at USD2396 in 2018, which is equivalent to 19% of the world's average meaning that the country is a low-income nation. In addition, 86.9 million (46.7%) of its populace is now living in extreme poverty,[15] and not forgetting the fact that management of schizophrenia can be lifelong with adverse effects of antipsychotics that may also persist for a long.[12,13] Furthermore, more than 90% of the populace are involved in out of pocket healthcare in Nigeria.[16] Thus, the need for the affordability of antipsychotics usage in schizophrenia management is of immense importance which has not been conducted in any part of the country.

The objective is to determine the levels of impoverishment, catastrophic expenditure and the number of days the least paid government worker will have to work due to OOP payments of antipsychotics in a sample of patients receiving treatment for schizophrenia in Benin City.

METHODS

Settings

This study was conducted in Benin City in south-south geopolitical zone of Nigeria. The city has a population of over 1.2 million people from 2006 national population census commission's report, and it is made up of three local governments areas (LGA), namely Oredo LGA, Ikpoba-Okha LGA and Egor LGA constituting 12 wards, 10 wards and 10 wards, respectively.[17]

A two-stage cluster cross-sectional sampling was used to select eligible persons. For Stage 1, a purposive selection of two different tertiary health institutions (because they are the only government-owned facilities that have the specialised health professionals that can manage people suffering from schizophrenia in the area) one institution from each local government. The hospitals are Federal Neuro-Psychiatric Hospital (FNPH), a stand-alone specialist facility which has over 250-bed spaces and run the outpatients clinic on every working day; and University of Benin Teaching hospital (UBTH), a general specialist facility with a capacity of over 800 beds and run outpatients clinic 2 days in a week. Each hospital has in their employment consultant psychiatrists, physicians, pharmacists, nurses, psychologists amongst other health professionals. For Stage 2: Two wards were randomly selected from the wards in each LGA of the City, then one community pharmacy that is involved in assessment, dispensing of antipsychotics' prescriptions were randomly selected from each of the wards selected.

Ethical consideration

Ethical approval for the study was granted by the two health institutions. The reference No for Psychiatric hospital is PH/A.864/vol. vii/12, that of UBTH is ADM/E22/A/vol. vii/1422 while that from pharmacies, administrative approval were sought from their respective establishments.

Inclusion criteria

Recruitment of participants from each of the sites was on voluntary basis, and consent of all participants in this study was obtained and where consent was not granted the next person in line was approached to be interviewed. Patients on an outpatient basis, not <18 years and receiving antipsychotic medication treatment were included in the study. All respondents that took part in the study did OOP payment for their medications.

Sample size determination and sampling technique

The sample size was determined using 0.5% prevalence rate of schizophrenia,[18] 1% precision employed in the formula $n = Z^2 P (1 - P)/d^2$,[19] where n = sample size, Z statistic for a level of confidence (95%), P = expected prevalence (0.5%), d = precision (1%), at least 192 schizophrenics were required. Patients who came to the hospitals' pharmacies and community pharmacies to fill their prescription were systematically randomised using a sampling interval of three.

Involvement of patients and the general public in the study

Respondents, household members and the public were not involved in the development of the research questions, in the design of the fieldwork or the recruitment of research assistants neither was they given results reported in the paper.

Outcome variables

The main outcome measures were the poverty headcount ratio, poverty gap, catastrophic expenditure and the number of days the least paid government worker will have to work due to OOP payments of antipsychotics by people with schizophrenia.

Impoverishment was defined as a situation where a household fell below the international poverty line (PL) (US$1.9 in purchasing power parity) after paying for antipsychotics.[20] with the threshold not exceeding 5% change in impoverishment.

Catastrophic expenditure was defined as OOP payment for antipsychotics exceeding a threshold of 5% of a household's annual income.[21,22] The WHO and Health Action was defined as OOP payment for antipsychotics exceeding a threshold of 1 day of the least paid government worker will have to work to buy a course of treatment 30 days' supply of medicines used to treat schizophrenia.[23]

Other variables included background characteristics of the patients receiving antipsychotics medications, name, dose and cost of their medications. The household annual incomes were recorded in Naira (NGN) converted to the US Dollars using the exchange rate of USD1 equal to 300NGN.[24] The mean OOP of antipsychotics employed in the study was determined and prices of the minimum effective dose of the oral antipsychotics prescribed in the City, which were olanzapine 5 mg, risperidone 2 mg, haloperidol 2 mg, trifluoperazine 5 mg and chlorpromazine 100 mg were also collected.

Data collection

Before the data collection began, three research assistants were trained in a 1-day training workshop on how to conduct the interviews and check the information for data completeness. Respondents were gotten after payment for their medication and as they wait for their medications to be filled in the pharmacy of the study sites. The study was explained to and a consent form signed by each respondent, the schizophrenics was interviewed by the principal investigator and researchers using a pretested structured questionnaire.

The questionnaire consisted of two sections, the first section contained questions on sex, age, income per month, marital status, occupation and educational level. The second section recorded the name of medication and the cost of therapy per month, where the therapy is not 30 days medication; it was extrapolated to be so. Each completed interview was checked promptly for any errors and edited if required. All questionnaires were reviewed at the end of each day for the accuracy of the data obtained.

Data analysis

After the data collection was completed, data were entered into Microsoft and statistics was conducted using SPSS 22.0 (IBM Software, Chicago, IL, USA).

Impoverishment method

The mean of each income group and PL were determined. Poverty headcount ratio was calculated with a formula PH = q/n, where PH is poverty headcount ratio, n is number of households with income/expenditure x_1, x_2,…., x_n, q is the number of households that have incomes below z, where z is the number of PL. The income gap is PG = $(z\text{-}x_a)/z$, where PG is Poverty gap, x_a is the number of average income for poor households, and z is the number of PL was determined.[25,26]

To know the income distribution between two groups of PL, one just below the PL and the other just after the PL, a plot of proportion of the sample ranked by income and average monthly income of respondents in naira was made, and the proportion of sample living below the PL from the plot can be gotten by applying the equation $Y = ([Y_2\text{-}Y_1/X_2\text{-}X_1]D)\ C$,[1] where coordinates of (X_1 Y_1) for point of group below PL while (X_2 Y_2) are coordinates of point of group above PL, D is the ratio between amount just below PL and the amount of PL, C is proportion of sample just below PL, [Figure 1].

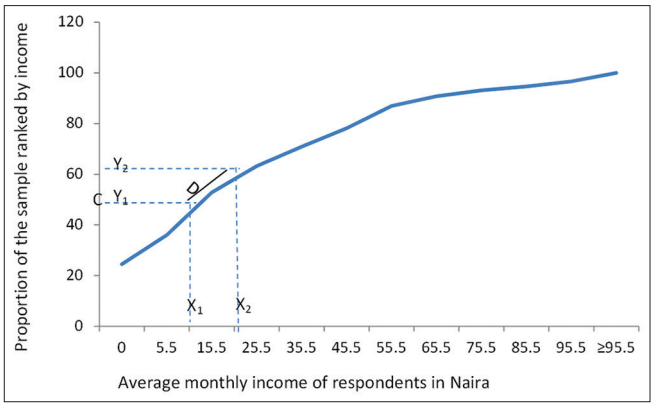

Figure 1: A plot of proportion of the sample ranked by income and average monthly income of respondents in naira

Pre-payment and post-payment of headcount ratios and poverty gap were measured by the number of households having household annual income below the PL before and after participants have purchased their medications. The percentage of change post-payment headcount ratios and poverty gap relative to that of prepayment was calculated.

Catastrophic expenditure

The percentage of the sample that exceeded 5% threshold of a medication was determined by estimating the proportion of the population that earns <20 times the amount (the minimum effective dose) of the medication.

World Health Organisation/Health Action International approach

The daily wage of the least paid unskilled government worker was calculated by dividing monthly (30 days) pay of the least paid unskilled government worker (minimum wage which is NGN30000[27] [USD100]) with 30 days. The number of days the least paid unskilled government worker will work to pay a certain antipsychotic to buy the lowest effective dose of the medication was determined by dividing the amount of the medication for 30 days by the amount of daily wage.

RESULTS

A total of 288 schizophrenics were included in the study, consisting of 165, 66, 57 patients from FNPH, UBTH and the community pharmacies. Respondents, 166 (58.3%) were male, 71 (24.7%) not employed, 154 (53.5%) single, 88 (30.6%) were in the age range of 30–39 years, 118 (41.0%) attained secondary level of education while 70 (24.3%) had no personal income [Table I].

Prices of the minimum effective dose of the oral antipsychotics for a month gotten from the settings revealed that olanzapine 5 mg, risperidone 2 mg, haloperidol 2 mg, trifluoperazine 5 mg, chlorpromazine 100 mg were NGN1800 (USD6), NGN1350 (USD4.50), NGN150 (USD0.50), NGN150 (USD0.50) and NGN210 (USD0.70), respectively. The average cost of antipsychotic used by respondents for olanzapine,

Table I: Baseline characteristics of the socio-demographics of respondents

Demographics	Sub-group	Number of respondents (%)
Sex	Male	166 (58.3)
	Female	122 (41.7)
Occupation	Not employed	71 (24.7)
	Government employee	65 (22.6)
	Self employed	47 (16.3)
	Private employee	45 (15.6)
	Student	44 (15.3)
	Retiree	16 (5.5)
Marital status	Single	154 (53.5)
	Married	80 (27.8)
	Divorced/separated	38 (13.2)
	Widow/widower	16 (5.5)
Age range (years)	≤19	12 (4.2)
	20-29	70 (24.3)
	30-39	88 (30.6)
	40-49	70 (24.3)
	50-59	17 (5.9)
	60-69	12 (4.2)
	≥70	19 (6.6)
Educational status	Primary	56 (19.4)
	Secondary	118 (41.0)
	Post-secondary	69 (24.0)
	Graduate	26 (9.0)
	Post-raduate	19 (6.6)
Average monthly income	No personal income	70 (24.3)
	1-10	32 (11.1)
	11-20	48 (16.7)
	21-30	29 (10.1)
	31-40	21 (7.3)
	41-50	26 (9.0)
	51-60	23 (8.0)
	61-70	10 (3.5)
	71-80	6 (2.3)
	81-89	4 (1.53)
	91-99	6 (2.1)
	≤NGN 100	13 (4.5)

NGN: Naira

risperidone, haloperidol, trifluoperazine and chlorpromazine are NGN4230 (USD14.10), NGN 4060 (USD13.53), NGN410 (USD1.37), NGN450 (USD1.37) and NGN390 (USD1.30), respectively [Table II].

The PL of NGN17100 (USD57) per month was calculated, this line recorded 159 schizophrenics living below PL before purchase of their medications while those below PL after purchase of olanzapine, risperidone, haloperidol, trifluoperazine and chlorpromazine were 173,167, 161, 161, 159 respondents, respectively.

Post-payment average income group just below PL at a proportion of 52.1% of the sample are NGN11270 (USD 37.57), NGN11440 (USD 38.13), NGN15090 (USD 50.30), NGN15050 (USD 50.17), NGN15110 (USD 50.37)

Table II: Payments of the schizophrenics for antipsychotics in Naira (*n*=288)

Antipsychotics	OOP payments (mean±SD)	OOP at lowest effective dose
Olanzapine	4230±1170	1800
Risperidone	4060±2920	1350
Haloperidol	410±62	150
Trifluoperazine	450±81	150
Chlorpromazine	390±61	210

OOP: Out-of-pocket, SD: Standard deviation

for olanzapine, risperidone, haloperidol, trifluoperazine, chlorpromazine, respectively, while that of post-payment average income group above PL at a proportion of 62.1% were NGN21270 (USD 70.90), NGN21440 (USD 71.47), NGN25090 (USD 83.63), NGN25050 (USD 83.50) and NGN 25110 (USD 83,70), respectively [Table III].

The percentage of patients that was further impoverished using poverty headcount ratios after purchase of olanzapine, risperidone, haloperidol, trifluoperazine and chlorpromazine were 11.1%, 7.4%, 3.7%, 3.7% and 1.9%h, respectively [Table IV]. The proportion of respondents who spend more than 5% of their income to get their olanzapine, risperidone, haloperidol, trifluoperazine, chlorpromazine were 70%, 64%, 28%, 28%, 34%, respectively, meanwhile that of number days' wage the least paid government worker will use to purchase the medication were 1.8 day, 1.35 day, 0.15 day, 0.15 day, 0.21 day, respectively [Table V].

DISCUSSION

The use of atypical antipsychotics such as olanzapine and risperidone have further made more people with schizophrenia more poorer beyond the acceptable limit that was set in this study while typical antipsychotics namely, haloperidol, trifluoperazine and chlorpromazine were within the limit. The impoverishment rate incurred on patients as a result of being placed on atypical antipsychotics can be unbearable considering the fact that Nigeria is a resource-limited country with mirage of economic indicators buttressing the nation's economic stance amongst community of nations.[15,16,24]

Affordability view from the catastrophic method revealed that those at risk incurring the risk of unaffordability for atypical antipsychotics were as high as at about twice the risk of the typical antipsychotics suggesting that the affordability of atypical antipsychotics is of concern. This challenge was also put forward from another study done in Washington were the risk of catastrophic expenditure of atypical antipsychotics was 15%–20%.[8]

An employee will work for as high as about 2 days to have enough earnings for just to procure his or her 1 month therapy of atypical antipsychotics such as olanzapine, this value is above the benchmark of wage not more than day to procure medications that will last 30 days for chronic condition,[23]

Table III: Proportion of the sample ranked by monthly income in Naira×1000 of respondents before and after oral antipsychotics medications expenditure (*n*=288)

Sample (%)	% Cum sample	Monthly income	Average monthly income[a]	Monthly income[b]	Monthly income[c]	Monthly income[d]	Monthly income[e]	Monthly income[f]
70 (24.3)	24.3	No personal income	0	0	0	0	0	0
32 (11.1)	35.4	1-10	5.5	1.27	1.44	5.09	5.05	5.11
48 (16.7)	52.1	11-20	15.5	11.27	11.44	15.09	15.05	15.11
29 (10.1)	62.2	21-30	25.5	21.27	21.44	25.09	25.05	25.11
21 (7.3)	69.5	31-40	35.5	31.27	31.44	35.09	35.05	35.11
26 (9.0)	78.5	41-50	45.5	41.27	41.44	45.09	45.05	45.11
23 (8.0)	86.5	51-60	55.5	51.27	51.44	55.09	55.05	55.11
10 (3.5)	90.0	61-70	65.5	61.27	61.44	65.09	65.05	65.11
6 (2.3)	92.3	71-80	75.5	71.27	71.44	75.09	75.05	75.11
4 (1.5)	93.8	81-89	85.5	81.27	81.44	85.09	85.05	85.11
6 (2.1)	95.5	91-99	95.5	91.27	91.44	95.09	95.05	95.11
13 (4.5)	100	≤NGN 100	≥105.5	≥101.27	≥101.44	≥105.09	≥105.05	≥105.11

Monthly income: [a]Before medication expenditure, [b]After olanzapine expenditure, [c]After risperidone expenditure, [d]After haloperidol expenditure, [e]After trifluoperazine expenditure, [f]After chlorpromazine expenditure. % Cum: Percentage cumulative frequency, NGN: Naira

Table IV: Impoverishment due to out-of-pocket payments for antipsychotics (*n*=288)

	Before antipsychotic payment	Impoverishment Olanzapine	Due to OOP Risperidone	Payments (%)		
				Haloperidol	Trifluoperazine	Chlopromazine
	Pre-payment	Post-payment	Post-payment	Post-payment	Post-payment	Post-payment
Poverty headcount count	0.54	0.60	0.58	0.56	0.56	0.55
Percentage change poverty headcount count		11.1	7.4	3.7	3.7	1.9
Poverty gap	0.03	0.07	0.05	0.04	0.04	0.04
Percentage change in poverty gap		133.3	66.7	33.3	33.3	33.3

OOP: Out-of-pocket

Table V: Percentage at risk of incurring catastrophic expenditure or number of days' wages used to purchase the minimum effective treatment dose with lowest priced generic of antipsychotics

Antipsychotics	Catastrophic (X_{Cat})[a]	Number of days' wages (WHO/HAI)[b]
Olanzepine	70	1.8
Risperidone	64	1.35
Haloperidol	28	0.15
Trifluoperazine	28	0.15
Chlorpromazine	34	0.21

[a]Catastrophic method, [b]WHO/HAI method. X_{Cat}: Percentage of the sample at risk of incurring a catastrophic expenditure at a threshold of 5% of per average income, WHO: World Health Organisation, HAI: Health action international

while that of typical antipsychotics such as haloperidol, trifluoperazine, chlorpromazine will cost less than half a day's wage. This revelation is in line with another study where it was posited that the number of day's wages that one will work to buy only olanzapine or risperidone across some countries in Europe ranged from about 1–12 days.[8]

Considering the chronic nature of schizophrenia,[9,10] the devastating tendency of this psychiatric condition if not well managed,[12,13] and unaffordability of typical antipsychotics, it will be better for respondents visiting this health facilities to be placed on typical antipsychotics but if they must be prescribed atypical antipsychotics due to its superiority in efficacy and tolerability,[9,10] such medications should be subsidised by government or should have insurance coverage for majority of the residents.

Limitation of the study

We assume linearity and plot the average income of each group at the midpoint that is with the assumption that mean and median are the same, this is quite different in actuality where income distribution within income group will naturally tilt due to the fact that more people in the group will most likely earn income less than the average income. More also, the age range of patients who were <18 years old were not collected as the inclusion of the set of individuals may give slightly different results.

CONCLUSION

Schizophrenics in Benin City receiving olanzapine, risperidone, haloperidol, trifluoperazine or chlorpromazine medication to managed their psychiatric condition are being impoverished more by 11.1%, 7.4%, 3.7%, 3.7% and 1.9%, respectively, at the risk of catastrophic expenses by 70%, 64%, 28%, 28%, 34%, h respectively, while that of number of days the least paid

government worker will have to work to get their drugs were 1.8 day, 1.35 day, 0.15 day, 0.15 day, 0.21 day, respectively.

There is a need for government, donor agencies and well-meaning individuals to subsidise the cost of antipsychotic medications and/or government should formulate a policy that will enrol all people with schizophrenia especially those on the atypical antipsychotic medications on insurance scheme.

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Conflicts of interest

There are no conflicts of interest.

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