

# Drug Utilization for Acute Illness at Household Level in Rural Community of Vadu, Pune: A Cross-sectional Study

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**Abstract** Drug utilization research is an essential part of pharmacoepidemiology as it describes the extent, nature and determinants of drug exposure. The principal aim of drug utilization research is to facilitate the rational use of drugs in populations. Nowadays Drug utilization studies (DUS) are used as potential tool in the evaluation of healthcare system and also to ascertain the role of drugs in society. It evaluates drug use at a population level, according to age, sex, education, social class, residence area and morbidity. This study was aimed to explore the utilization pattern of medicines available at home with special attention to the types of medicine (with or without prescription) and their appropriate utilization (dosage compliance) and intended self-medication & to determine the use of drugs for the health problems in rural community of Vadu. Community drug-use habits were studied in 200 household units in rural community of Vadu. Descriptive statistics was used for analysis of data. 91.5% (n=183/200) of the investigated families had at least one drug product stored at home. The study revealed the incompliance after relief with repeated use of unfinished stored drugs (55.0%) while 59.3% (n=149/250) of drug exchange among families. The heads of households with education level >10<sup>th</sup> standard showed more drug-hoarding than those with education level below it (OR<sub>a</sub>=1.48, 95%CI=1.29-2.43). The healthcare seeking behaviour towards healthcare professional was found 82.00% (82/100) among children less than 10 years by their parents than the other age groups. Conclusion: Drug hoarding, sharing with modern drugs are commonly practiced in the community, so they should be avoided through educating general public on drug use so as to minimize the risk of using expired drugs, adverse events, accidental poisoning; under dose, inappropriate use; and combat antimicrobial resistance.

**Keywords:** Drug Utilization Study (DUS), drug hoarding, rural community, Drug Utilization Evaluation (DUE).

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## 1. Introduction

Drug Utilization Research was defined by WHO in 1977 as "the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences." [1]

Drug utilization study focuses on the factors related to the prescribing, dispensing, administering, and taking of medication, and its associated events, covering the medical and non-medical determinants of drug utilization. [2] DUS provides the methodological rigor for defining the data needed in pharmaco-epidemiological research. DUS assesses drug effects in large heterogeneous populations for longer periods. It makes useful contribution towards knowledge on safety & effectiveness of drugs. [3]

DUS create a sound sociomedical and health economic basis for healthcare decision making. [4] The incorrect use

of medicines is one of the greatest problems experienced by the community population. [5] It is important to realize that inappropriate use of drugs represent a potential hazard to the patients and an unnecessary expense. [6] Costly antibiotics are perceived as "Magic Pills" and are stopped as soon as patients feel better.

### 1.1. Description of Drug Use Patterns

Drug utilization research can increase our understanding of how drugs are being used. It can be used to estimate the numbers of patients exposed to specified drugs within a given time period. Such estimates may either refer to all drug users, regardless of when they started to use the drug (prevalence), or focus on patients who started to use the drug within the selected period (incidence). It can describe the extent of use at a certain moment and/or in a certain area (e.g. in a country, region, community or hospital). Such descriptions are most meaningful when they form

part of a continuous evaluation system, i.e. when the patterns are followed over time and trends in drug use can be discerned. Researchers can estimate (e.g. on the basis of epidemiological data on a disease) to what extent drugs are properly used, overused or underused. It can determine the pattern or profile of drug use and the extent to which alternative drugs are being used to treat particular conditions. It can be used to compare the observed patterns of drug use for the treatment of a certain disease with current recommendations or guidelines. It can be used in the application of quality indicators to patterns of drug utilization. All prescribing is not necessarily based on patient needs and all patient needs are not necessarily met with drug therapy. Consequently, there is much concern about inappropriate and expensive prescribing. [7]

## 1.2. Common Practices of Inappropriate Drug Use

Research over the years has identified a number of common areas of inappropriate medicine use that have a negative impact on the health of consumers. [8] These include:

- i) Not taking medicine in the way intended by the prescriber
- ii) Self-medication with prescription drugs
- iii) Misuse of antibiotics
- iv) Overuse of injections
- v) Overuse of relatively safe medicines
- vi) Unsafe use of herbal medicines
- vii) Use of non-essential combination drugs
- viii) Use of needlessly expensive medicines.

Ideally, a good complier is a patient who adheres strictly to the recommendation on dosage, duration, time and manner of administration of medication. [9] Self-medication with antibiotics in community is common in third world countries. Hence people are willing to pay high prices for antibiotics, and if they cannot afford a full course, they will purchase them in smaller quantities. [10] Self-medication may also be influenced by low severity of illness. [11]

## 1.3. Why Community Based Household Survey?

Household storage of pharmaceuticals is widely practice either in developed or mostly in developing countries, among others are in order to self-medication practices and for emergency purposes. Patients often have multiple chronic diseases, use multiple prescriptions and over the counter medications resulting in polypharmacy. Many of them store these medications for future use in their homes, rather than take them as directed by their physician, resulting in a waste of health care resources, and potentially dangerous misuse. [12]

Rational use of medicines is a crucial part of the national health policy and access to medicines is a tool to improve and maintain health. Rational use of medicine has been defined as patients receive medications appropriately to their clinical needs, in doses that meet their individual requirements, for an adequate period of time, and at the lowest cost to them and their community while irrational

or non-rational use is the use of medicines in a way that is not compliant with rational use. [13]

## 1.4. Community Based Study at Household Level

Information on demographic factors *i.e.* Age; gender; ethnicity; co-morbidities; knowledge; beliefs & perceptions and other details about the patient will often be useful. For instance, in the management of hypertension, beta-blockers should not be used to treat patients with asthma, and ACE inhibitors are the preferred treatment. Cross-sectional data provide a “Snapshot” of drug use at a particular time.

The drugs available in households have either been prescribed or dispensed at health facilities, purchased at a pharmacy (with or without a prescription) or are over-the-counter medications. The drugs may be for the treatment of a current illness or are left over from a previous illness. It is not uncommon for patients to adhere poorly to the instructions given for taking their dispensed medicines. Thus dispensing data and utilization data may not be equivalent because they have not been corrected for non-compliance. Drug utilization by outpatients is best assessed by performing household surveys.

## 1.5. Types of Drug Utilization Studies

### a) Quantitative (DUS):

Quantify current state of drug use

Study trends of drug use

Study time course of drug usage at national, regional, local or institutional levels

### \*Uses of Quantitative DUS:

To estimate drug utilization in populations by demographic characteristics

Used as denominators to calculate rates of ADRs

To monitor Specific therapeutic categories Effects of regulatory activities

Markers for crude estimates of disease prevalence

To plan importation, production & distribution

To estimate drug expenditures

### b) Qualitative (DUS):

Study appropriateness of drug utilization

Links prescription data with drug indications Uses

### \* Uses of Qualitative DUS:

To study appropriateness of drug uses

To assess clinical efficacy

The ultimate purposes of DUS are to contribute to the optimal quality of drug therapy by identifying, documenting and analyzing problems in drug utilization and monitoring the consequences of interventions. Different types of drug utilization studies can be conducted and various methods can be used. Special emphasis is placed in this review on consumption studies. The study of drug utilization continues to evolve. The development of large computerized databases linking drug utilization to diagnoses and other lifestyle information has made drug utilization studies a powerful scientific tool for ensuring the rational and cost-effective use of drugs in society. The pioneer of this research understood that a correct interpretation of data on drug utilization requires investigations at patient level.

Patients are better educated, have greater expectations from health care, and frequently use multiple sources of health care. Yet, drugs are frequently not used to their full potential or according to the generally accepted criteria. All prescribing drugs are not necessarily based on patient needs and all patient needs are not necessarily met with drug therapy. Consequently, there is as much concern about inappropriate and expensive prescribing, as about under-prescribing. The development of drug utilization as a research area made it possible to study drug prescribing and drug usage in a scientific and formal manner.

Essential medicines are one of the vital tools needed to improve and maintain health. However, for too many people throughout the world medicines remain unaffordable, unavailable, unsafe and improperly used. When available, the medicines are often used incorrectly: where medicines are prescribed, dispensed or sold inappropriately and patients fail to take their medicines appropriately. [8] Irrational use of medicines is a worldwide problem, which has a serious impact on health and economy. [14] The optimal benefits of drug therapy in patient care in every community may not be achieved because of inappropriate drugs use. [8]

One of the inappropriate drug uses is prematurely discontinued treatment course when they felt that the symptoms had abated and kept the rest of the medicines for future use. [15] Other forms of inappropriate drug use are drug sharing and self-medication. Sharing of drugs can be within and across households for friends, neighbours and relatives. Drug utilization can be influenced by socio-demographic factors such as age, sex, social status; education, morbidity, cultural heritage, individual attitudes, and personality are among the factors that have been associated with the use of medicines. [16] But overall, morbidity is the strongest predictor of drug utilization. There has not yet been any systematic research conducted on the utilization of drugs at the household level, little is known about patterns of drug utilization at household level. [17]

At household level drug may be utilized in different ways such as being hoarded and re utilized, shared with household and/or outside households for neighbours and might be used for self-medication inappropriately. We supposed that information obtained from this study may be used to improve rational use of drugs by policy makers.

Drugs use is complex process. The boost in the marketing of new drug, wide variation in the pattern of drug prescribing and consumption growing concern about the delayed adverse effects, increasing concerns regarding the cost of drug and volume of prescription, all contribute to the increasing importance of Drug Utilization Studies (DUS). Studies on drug utilization focus on the factors related to prescribing, dispensing, and administering of medication, its beneficial adverse effects.

Drug Utilization Evaluation (DUE) –Authorized, Structured ongoing review of physician prescribing, pharmacist dispensing and patient use of medication. DUE studies ensures whether the drugs are used appropriately, safely and effectively.

Drug Utilization can be studied under 4 categories...

i) Drug-User (or Patient) Factors (e.g. Socio-demographic parameters & attitudes towards drugs): Drug utilization studies may evaluate drug use at a population level or

household level, according to age, sex, social class, morbidity, among other characteristics.

ii) Prescriber (Healthcare Professional) Factors (e.g. Education & factors influencing therapeutic decisions): DUS can be used for correlation of prescription data to the reasons for the drug prescribing. The research in this field aims to analyze the present state and the developmental trends of drug usage at various levels of the health care system, whether national, regional, local or institutional. DUS may contribute to rational prescription of drugs (e.g. antibiotics).

iii) Drug characteristics (e.g. therapeutic properties & affordability to Patients): The assessment of how drug utilization relates to the effects of drug use, beneficial or adverse.

iv) Problem Based Information: Pattern of drug utilization in particular disease.

## 1.6. Study Rationale

Without knowledge of how drugs are being prescribed and used, it is difficult to initiate a discussion on rational drug use or to suggest measures to improve prescribing habits. At household levels drug may be hoarded and re-utilized inappropriately, shared within families and/or outside family and unnecessarily utilized in self-medication. Hence this study was conducted to assess drug utilization at household level in rural community. Also this study mainly aims at Drug-user parameters at household level in rural community to decide drug utilization.

## 1.7. Aim

To study the prevalence of drug hoarding, self-medication with modern drugs and drug sharing practice at household level.

## 1.8. Objectives

### Primary Objective:

1. To assess appropriateness of drug utilization pattern
2. To evaluate drug hoarding or drug storage for future use

### Secondary Objective:

1. To assess disease conditions for which medications are utilized

## 2. Material and Methods

### 2.1. Design and Study Population

This was a prospective cross-sectional, observational study carried out in compliance with the Declaration of Helsinki, ICH-GCP, Schedule Y, ICMR and other applicable regulatory guidelines. This study was conducted in a village, named Vadu, District Pune which is situated about 30 km from Pune (Pune-Nagar Road) over a period of 8 months (from August 2015 to March 2016) after taking permission from the Institutional Ad-Hoc Committee. This conveniently selected village is the field practice area of KEM Hospital Research Centre, Pune.

## 2.2. Sample-size Calculation

Simple random sampling method was used. Sample size was estimated using formula  $N=4pq/L^2$ .

L= Margin of Error=6.89%

Confidence Level= 95%

Population Size =20000

p= Response distribution=50%

q= (1-p) =50%

By using Raosoft Sample Size Calculation software:

N= 200.

## 2.3. Data Collection

This study was carried out with the help of field research assistants working in Vadu area who were well educated and trained to collect data. The methodology is basically participatory and action-oriented with the local organization being given much flexibility in the manner of implementing the project. Questionnaires were initially drafted based on previous drug utilization studies. Translations and pre-testing were done. Selection of data and household clusters were done by the community health workers who served as data collectors. Data collection was essentially through the same process using the structured questionnaire to document the information gathered. The data includes the following: a socio-economic and demographic profile; a use of medicines within a reference period including the name of medicine, source, indication, dosage, quantity purchased, price, source of information, adverse experiences and other relevant information. The data collected from 200 households which were in two parts i.e. for patient in the household and other for self medication and drug hoarding (preservation for further use).

The details of medicines available in the house as: (i) number of homes having medicines; (ii) number of formulations with and without prescriptions; (iii) number of formulations with package inserts & expired formulations; (iv) Dosage forms of medicines; (v) pharmacological class wise distribution of medicines; (vi) status of the medicine use whether for current use, future use or leftover; and (vii) Appropriateness of medicines with and without prescription in relation to dose and duration of treatment.

## 2.4. Statistical Analysis

Statistical analysis was done using Epi-info software version 7.2.0.1 Descriptive Statistics was used in this study.

## 3. Literature Review

The Study done by *Sado & Gedifin* 2014 was descriptive cross-sectional study among households' heads to assess the prevalence of drug hoarding, drug sharing, self-medication and their determinants. A total of 409 (49.9%) households head hoarded drugs at their home. Out of that, 24.9% of the households have drug sharing practice with friends & families. Drugs used for the treatment of infectious diseases were the second most hoarded types of drugs at household level 180 (25%), next to Analgesics such as

Paracetamol, Diclofenac, Ibuprofen and Aspirin which were the leading drugs 294 (41%) and the other significant categories of drugs kept in the households were GIT drugs 100 (13.9%), CVS drugs and drugs used for endocrine disorders 28 (3.8%) and respiratory drugs account 29 (4%). The study showed that place of residence and levels of education were significantly associated with drug hoarding at households' level. [18]

The Study done by *Amare et al.* in 1997 was revealed that 17% of households were found to practice drugs sharing within the households or outside households for friends and neighbours. [15]

It was indicated by *Ketersediaan & Obat* in 2014 that Re-use of leftover drugs for self initiated treatment is unsafe, especially antibiotics and other prescription drugs which should be used under supervision of medical professional. Medicines are being purchased by patients in India with or without prescription and are stored at home. Prescription drugs are intended mainly for current use and sometimes left unused, which may get expired or may be repeated in the form of self medication. [19]

The Study done by *Mirza & Ganguly* in 2016 was aimed to explore the utilization pattern of medicines available at home with special attention to the types of medicine (with or without prescription) and their appropriate utilization (dosage compliance) and intended self-medication. [20] The evaluation of utilization of medicines, in urban and rural population describes high drug storage, higher leftover medicines and inappropriate use of medicines and many self medicated by patients which suggests the need to educate the patients about proper and rational use of medicines.

The study done by *Bhatnagar, Mishra & Mishra* in 2003 indicates the prescribing practices in Varanasi region of the country have been far from satisfactory, with rational drug therapy being made use of in one-third cases only. On one hand this calls for prescription audit on adequate sample size in the community at large vis-a-vis at health facility level and on the other the pertinence of orienting health care providers at all levels towards rational drug use and healthy prescribing practices is beyond doubt. [21]

Community rights and responsibilities must be underpinned by education and information. Many studies point to major misconceptions and misuse of drugs by prescribers, dispensers and consumers. Research from such countries as Ethiopia [22], Ghana [23], India [24] shows that consumers in general know very little about the drugs they use, their effects and their basic mechanisms. Other studies show that although modern pharmaceuticals are based on a rational-scientific model, in practice, they are distributed, prescribed and used in ways that frequently don't accord with that model.

## 4. Results

### 4.1. Baseline Characteristics

A total of 200 households were enrolled in the study. Total 53% (106/200) Female participants while 47% (94/200) were Males. In this sample, females were more than males.

2/3<sup>rd</sup> of the study population (153/200) belonged to 0 to 30 years of age. About 1/4<sup>th</sup> of the head of the family had university degree (48/200) while 37% (74/200) had completed 12<sup>th</sup> or intermediate or 10<sup>th</sup> standard.

**Table 1. Age groups and sex distribution of the patients & healthy participants**

Age Groups	Males	Females	Total
< 10 years	53	47	100
10 to 30 years	22	31	53
30 to 50 years	12	23	35
>50 years	7	5	12
Total	94	106	200

**Table 2. Ill patients and healthy participants**

Participants	Number	Percentage
Healthy	14	7 %
Ill and visited Doctor	180	90 %
Ill and not visited Doctor	6	3 %

**Table 3** indicates that there were no any Cardiovascular or metabolic disorders found in the study. It would be due to less number of study participants above 50 years age group (6.0%) out of total sample size.

**Table 4** indicates that since 50% of the study population belongs to the Paediatric age group (<10years), majority

of the adverse events or health problems are belongs to Respiratory & Gastrointestinal tract systems.

**Table 3. System wise Classification of Diagnosis or Signs & Symptoms**

Sr No.	System wise Classification of Diagnosis or Signs & Symptoms	No of Patients	Percentage
1	Respiratory System: (URTI, LRTI)	37	20.44 %
	Coryza	53	29.28 %
2	GI System : Gastroenteritis	22	12.15 %
	Abdominal Discomfort	9	4.97 %
	Hyperacidity	6	3.31 %
	Ulcers	2	1.10 %
3	Skin : Rashes	3	1.66 %
4	Musculoskeletal System: Arthralgia, Myalgia	6	3.31 %
5	Infectious: Fever	7	3.87 %
6	Nervous System: Headache	9	4.97 %
7	Dental Caries	4	2.21 %
8	Metabolic Disorders: Diabetes	1	0.55 %
9	Others	22	12.15 %

**Table 4. Comparison of Diagnosis with Age groups**

Diagnosis	< 10 years	10-30 years	30-50 years	> 50 years
Coryza	30	12	8	2
RTI	28	3	6	0
GE	8	6	1	0

**Table 5. Parameters of DUS at Household level**

Topic	Options	No	(%)
Way of taking medicines {n=215 Encounters in 200 HH}	Doctor	192	89.30 %
	Pharmacist	11	5.12 %
	Self	12	5.58 %
Therapeutic categories of drugs used/ prescribed (n=217)	Analgesic-Antipyretic	42	19.35 %
	Antibiotic	73	33.64 %
	Corticosteroids	11	5.07 %
	NSAIDs	42	19.35 %
	Expectorants	13	5.99 %
	Antihistamines	18	8.29 %
	Others	18	8.29 %
Classes of antibiotics used (n=73)	Cephalosporin	25	34.25 %
	Macrolide	12	16.44 %
	Fluoroquinolones	9	12.33 %
	Penicillin based Antibiotics	15	20.55 %
	Other Antibiotics	12	16.44 %
Preservation of drugs and Storage of drugs (n=169)	Improper	128	64.00 %
	Proper	41	20.50 %
Medication of preference (n=250)	Allopathic	184	73.60 %
	Ayurvedic	29	11.60 %
	Homeopathic	37	14.80 %
Source of drug information from different resources (n=199)	Doctors	166	83.42 %
	Pharmacist	19	9.55 %
	Advertisements	7	3.52 %
	Internet	5	2.51 %
	Friends	2	1.01 %
Medication stored in house for future use (n=183)	Analgesic-Antipyretic	81	44.26 %
	Antacids	46	25.13 %
	Anti-diarrheal	40	21.85 %
	Antidiabetic	4	2.18 %
	Antibiotics	8	4.36 %
	Antihypertensive	4	2.18 %
Distribution of AEs from medications among participants (n=46)	Headache	3	6.52 %
	Dizziness	14	30.43 %
	Vertigo	6	13.04 %
	Nausea	17	36.96 %
	Vomiting	6	13.04 %

## 5. Discussion

Self-medication is widely practiced in many developing countries. The practice of self-medication is widespread all over the world especially urban and educated population. The extent and depth of knowledge regarding self-medication in community needs to be assessed. Previous studies have shown that the prevalence of self-medication as 37% in urban population and 17% in rural population in India, whereas 12.7-95% in other developing countries. Prevalence of self-medication has been found among 81.5% individuals in a rural area in Maharashtra. More male patients used self-medication compared to females, contrary to data from Western reports. Prevalence of self-medication could not be compared across different studies due to their varying nature of definitions used, recall period considered for definition, region selected and methodology adopted. Allopathic medicine was used by 69.6% respondents, which are consistent with studies carried out by Krishnaswamy & Kumar in 2005 (69%). [25] Fever, pain, respiratory problems followed by headache was most common conditions for which people have used self-medications. A study from Jamnagar, Gujarat reported with 64% NSAIDS as most commonly used drugs for self-medication. [26] Solid dosage forms (tablets and capsules) were the major forms of medicines kept at homes which matched with the studies done in Ethiopia, Palestine and Northern Uganda [27,28,29].

## 6. Conclusion

In most developing and transitional economies, medicine represents the second largest Government health expenditure after personnel cost. A majority of these can be reduced by properly educating these subjects to the need of proper compliance and adherence, knowledge of properly preserving the drugs in the house-hold, consulting trained doctors as and when necessary avoiding quacks and traditional healers, limiting self-medication and use of over the counter (OTC) products to minimum.

## 7. Limitation of Study

The study was done in a rural community area & hence similar comparative studies should be done in rural & urban community area with varied & larger sample size and data should be collected from all seasons.

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