PREVALENCE OF SELF-MEDICATION OF ANTIBIOTICS IN CHILDREN AND PARENTAL PERCEPTION AND KNOWLEDGE REGARDING ANTIBIOTIC USE AND RESISTANCE IN NATORE DISTIRCT

A Dissertation submitted to the Department of Pharmacy, East West University, Bangladesh, in partial fulfillment of the requirements for the Degree of Bachelor of Pharmacy

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Dedication

This research work is dedicated to my beloved parents, honorable faculties and loving friends

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List of Abbreviation

1	**FDA**	United States Food and Drug Administration
2	**GRAS/E**	Drug Generally Recognized as Safe and Effective
3	**HIV**	Human Immunodeficiency Virus
4	**IL**	Interleukin
5	**NDA**	New Drug Application
6	**OTC**	Over The Counter
7	**SM**	Self Medicate
8	**(TNF)-α**	Tumor necrosis factor
9	**TB**	Tuberculosis
10	**WSMI**	World Self Medication Industry

Abstract

A survey was conducted in Madhnagar, & Naldanga Thana of Natore district in Bangladesh which is entitled by "prevalence of self-medication of antibiotics in children and parental perception and knowledge regarding antibiotic use and resistance". The aims and objectives of this research were to identify the prevalence of self-medication with antibiotic to children, to determine parent's knowledge, attitude and practice of self-medication by exploring the knowledge and attitude about self-medication of antibiotics. This survey was based on questionnaire and had a sample size of 500 participants whose children's were suffered from any disease during last six month and had experience in using antibiotics. After this study it is seen that most of the children were suffered from cough and cold and fever and a number of parents thought their child's health status is poor enough to medicate antibiotic. The self-medication tendency of parents to their children varies on education level, age, previous experience, sort of disease and monthly net house hold income. But self medication level is low in this area and high educated people actually self medicate their children most of the time. On the other hand in this area village people don't have any clear idea about antibiotics because they are not so educated. So, they cannot easily self medicate their children. Another fact is that in this area government hospital is situated in village area and people get health care facilities from doctors and health care personnel. As a result self medication tendency is very less (95%). But having many facilities some times for the low education level they don't understand perfectly how to administered antibiotic to their children and its side effects. As a result resistance grows very easily. Widely used prescribed antibiotics are Azithromycin (34.07%), cefixime (19.75%), cefurozime (2.46%) , ciprofloxacin (21.23%) and used antibiotics for the self medicated are amoxicillin (10.05%), Azithromycin (30.52%), cefixime (30.52%). When the parents were asked about antibiotic resistance then most of the respondents said that they do not have any idea about antibiotic resistance. Some educated people response about antibiotic resistance but not fully. So, parents should be aware of the resistance of the antibiotic and stopped practicing self medication antibiotic in children. And health ministry of government should take proper initiative and ensure the rules and regulation for purchasing and dispensing the antibiotic to prevent the misuse of antibiotic.

Keywords: *Self-medication, antibiotics, prevalence, diseases, health status, antibiotic resistance.*

CHAPTER - 01

Introduction

1. Introduction:

1.1 Overview:

The emergence and spread of resistance related to the irrational use of antibiotics is a major global public health problem. Such as the rapid increase in drug-resistant *Streptococcus pneumoniae* infections is a particular concern in pediatrics because pneumococci are the leading cause of bacterial meningitis, pneumonia, bacteraemia in children. It is estimated that more than 50% of antibiotics worldwide are purchased privately without a prescription, from pharmacies or street vendors in the informal sector. The situation in developing countries is of particular concern because the use of antibiotics without medical guidance is largely facilitated by inadequate regulation of the distribution and sale of prescription drugs. Self-medication has also been noted in the United States of America and Europe, particularly for colds and upper respiratory tract symptoms, which are self-limiting and mostly caused by viruses. Self medication with antibiotics is widespread worldwide problem. A large number of studies had been done in both developed and developing countries. The use of non-prescribed antibiotics for self-medication raises questions about the risk of inappropriate use of drugs. According to World Health Organization inappropriate use of antibiotics includes improper antibiotic selection, inadequate antibiotic dosage, and insufficient length of use. Self-medication is still an important public health problem throughout the world; since it is a fairly common practice unjustified and inappropriate self-medication results in wastage of healthcare resources and increases resistance of pathogens, drug-drug interactions, and adverse drug reactions. Many studies over worldwide detect inappropriateness regarding the use of self-medicated antibiotics. The inappropriate use of antibiotics cause severe public health problems and also plays a vital role for antibiotics resistance which is worldwide major concern.

A cross-sectional survey was done in Naldanga, Madhnagar the village of Natore district of Bangladesh to find out the reasons behind self-medication of antibiotics in children and also in this research we want to know about the parental perception, their knowledge regarding to the use of antibiotics and its resistance. Therefore, the main concern of this research is to

inform and create awareness of public about the inappropriate use of antibiotics and improve the safe use of antibiotics in Bangladesh. (Haak, Radyowijati, 2003)

1.2 Self medication:

Self-care may be defined as the care taken by individuals towards their own health and well being, including the care extended to their family members and others. In practice self-care includes the actions people take to stay fit and maintain good physical and mental health; meet social and psychological needs; prevent illness or accidents; avoid unnecessary risks; care and self-medicate for minor ailments and long-term conditions; and maintain health and well being after an acute illness or discharge from hospital. Self-medication is the treatment of common health problems with medicines especially designed and labeled for use without medical supervision and approved as safe and effective for such use. Medicines for self-medication are often called 'non-prescription' or 'over the counter' (OTC) and are available without a doctor's prescription through pharmacies. In some countries OTC products are also available in supermarkets and other outlets. Medicines that require a doctor's prescription are called prescription products (Rx products). Self-medication with OTC medicines is sometimes referred to as 'responsible' self-medication to distinguish this from the practice of purchasing and using a prescription medicine without a doctors' prescription. This is irresponsible (and potentially even dangerous) 'self-prescription', and has no place in self-care or (responsible) self-medication. (WHO, 2008)

1.2.1 Definition of self-medication (SM):

According to The World Health Organization (WHO) had defined self medication as:
"Self-medication is the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms." In addition to self-manageable diseases, self-managing chronic diseases based on an initial medical assessment is also considered by the WHO as self medication. Further, the WHO states that the medicines used must be legally available without prescription; and safe and effective to be used following the instruction of use printed in the package. The information in the package should also describe other important information to ensure the safe of medicines for self-medication. The information which are leveled on the package are the therapeutic effect, potential side-effects, how to monitor

adverse effect, interactions of drug with others medicines and also with the food, contraindications, duration of therapy and dose etc. (Khantjian, 2009)

According to World Self Medication Industry (WSMI), *"Self-medication is the treatment of common health problems with medicines especially designed and labeled for use without medical supervision and approved as safe and effective for such use".* (WSMI, 2016)

Self-medication can be defined as the use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms. In Bangladesh, as in other countries, self-medication is a widespread practice and the majority of medications consumed by the population are sold without medical prescriptions. Medicines for self-medication are often called 'nonprescription' or 'over the counter' (OTC) and are available without a doctor's prescription through pharmacies. In some countries OTC products are also available in supermarkets and other outlets. Medicines that require a doctor's prescription are called prescription products.

Self-medication with antibiotics constitute a major form of irrational use of medicine and can cause resistant of microorganisms, failure of treatment, toxicity of medicine, prolonged hospitalization periods and also increase in morbidity. One of the main challenges that have emerged over the decades is the non-prescription use of antibiotics, which reduce the effectiveness of antibiotics in different types of bacterial infection. (WSMI, 2016)

1.2.2 The benefits and risks of self-medication:

It is widely accepted that self-medication has an important role to play in health care and, with the continued improvement in people's education, general knowledge and socio-economic status; self-medication has been successfully integrated into many health care systems throughout the world.

Self-medication products are those not requiring a medical prescription and which are produced, distributed and sold to consumers for use on their own initiative. Responsible self-medication can be used to prevent and treat symptoms and ailments that do not need medical consultation or oversight. This reduces pressure on medical services, especially when these are limited. For those populations living in rural or remote areas where access to medical services may be difficult, patients are able to control their own conditions to a greater extent.

Only if the condition fails to respond, persists, or becomes more severe will the patient need to seek professional medical care.

Other factors have also contributed to prescription drugs being deregulated to over-the-counter (OTC) sale and new drugs with specific pharmacological action have been successfully reclassified from prescription to non-prescription status in many countries. For example, in the United States of America, products containing over eighty active ingredients of different therapeutic groups were switched from prescription-only to OTC status between 1976 and 2000. In many cases, restrictions imposed on reimbursement of prescription drugs have provided the impetus for authorities to evaluate and deregulate self-medication products to OTC status.

Although many countries categorize medicines as either OTC or prescription-only, research data indicate that sale of self-prescription products (i.e. buying prescription-only drugs without a prescription) is far more common than sale of OTC drugs. It is a reality that medical personnel are in very short supply in many parts of the world and legislation is lacking. Also, the cost and time of visiting a licensed medical practitioner may seem prohibitive for many patients if they do not consider the illness or condition serious enough.

According to a consumer interview study carried out in six Latin American countries, only 34% of dispensed medicines were classified as OTC. It was concluded that a relatively high percentage of drugs were being dispensed without medical prescription or follow-up and this was attributed to lack of access to medical care. The equal concern is the fact that, in many countries, although OTC medicines are provided with a patient information leaflet the self-prescriber does not receive any information what so ever on how to use a prescription medicine.

Interestingly, it is the increase in competitive promotion of self-medication products which has enhanced consumer and patient awareness of the availability of products. Worldwide promotion and cross-border sale of medical products via the Internet is another factor affecting consumer behavior which is set to boost demand. Already, the Internet offers a considerable amount of websites promoting mail order. Many of these sites are not secure in

terms of guaranteeing the safety and quality of the products. However, there is no doubt that in the future self-prescription product sales through the Internet will increase enormously. This could create additional demand to switch prescription products to OTC status.

However, there are several critical issues that must be explored before promoting the potential benefits of self-medication. Any self-medication product should be safe for use. This implies the availability of appropriate consumer information and avoidance of any delay in diagnosis and treatment of diseases not suitable for self-medication. Furthermore, self-medication drugs are known to interact with many prescription-only drugs, alcohol and foods. Interactions are avoided in the event of self-medication unfortunately, before making out a prescription; many doctors do not enquire whether patients are also using self-medication products. Additionally, promotional messages through the media and the Internet tend to convey a feeling of confidence in the safety of the product and often give the impression that self-medication products are just another consumer article. In other cases, excessive or non-medical use may be a problem. Reports have been received of OTC medicines being misused by drug addicts and, according to a recent study in Northern Ireland; pharmacists admit that OTC drugs may be used in this way.

There are several critical issues involved before deciding if drugs should be authorized for self-medication. First and foremost, the principle is that no drug is absolutely safe. Self-medication is, in the majority of cases, applied without medical supervision and, to a certain extent, is an uncharted area with regard to interactions, pregnancy, lactation, use in children and the elderly, driving, working conditions, alcohol, or food compared to the more controlled prescription-only environment. In many countries, the possibility of reporting adverse drug reactions (ADR) to self-medication products is not available since many conventional ADR reporting schemes operate through health care professionals. Only in a small number of countries with highly developed ADR systems are patients and consumers able to report ADRs directly to the authorities or through pharmacies. Moreover, clinical trial data for prescription use may not necessarily be valid for self-medication. This situation is beginning to improve within some countries that now demand OTC-environment studies to be undertaken before registration.

Special mention should be made of the heavy reliance placed on OTC analgesics. These have long been associated with chronic renal failure. Many earlier reports implicated phenacetin-containing analgesics as the risk factor. Since the early 1980s, several case-control studies have reported associations between chronic renal failure and use of other forms of analgesics, including paracetamol, aspirin, and other nonsteroidal anti-inflammatory drugs (NSAIDs). Although findings from these studies should be interpreted with caution, the use of OTC analgesics is widespread and the potential impact of these drugs on the development of chronic renal failure may be significant. Furthermore, the consumer may be unaware that several products with different brand names and for different indications may contain the same active ingredient.

Consumers need independent information to ensure the safe, effective and rational use of drugs in self-medication. Advice to the consumer or patient should include a description of how to use the product without medical supervision and the circumstances in which referral for medical advice is necessary. In many cases, self-medication products are also understood to mean alternative medicines, food supplements, vitamins, herbs or other substances contained in commercially available products. Many are also sold in pharmacies or health food stores and have not been clinically tested and do not have a scientific basis for their recommended medicinal use. Moreover, certain products can cause severe safety problems. In highly regulated markets, pharmacists and other health care providers that recommend alternative medicines expose themselves to malpractice and liability claims if a patient is either injured or has treatment inappropriately delayed as a result of recommending such products.

In conclusion, self-medication can facilitate access to medicines and reduce health care costs. But more specific studies are needed to evaluate the impact and role of self-medication in the diversity of settings of different health care sectors. The combined efforts of industry and regulators must meet the expectations of consumers by providing products which are safe, effective, good value for money, and accompanied by complete and relevant information. High ethical standards should be applied to the provision of information, promotional practices and advertising. The content and quality of such information and its mode of

communication remains a key element in educating consumers in responsible self-medication. (Hughe, *et al,* 1999)

1.2.3 Self-medication practice of antibiotic in developed & developing countries:

1.2.3.1 Self-medication practice of antibiotic in Chinese city:

Identification of self-medication and antibiotics abuse by parents treating their children aged between 2 and 18 over the previous year, an investigation was conducted in Hefei City, China in April, 1995. A total of 1596 students from a kindergarten, a primary school and a high school were included in the study and the response rate is very high. The results showed the rate of parental self-medication for their children in the sample was 59.4%. It increased with children's age; about 51% of children had received parental self-medication on six or more occasions during the 1-year period and 32.8% on four to five occasions; there were associations between parental self-prescribers and sources of medicine and severity of disease. The rate of antibiotics abuse was 35.7%. Logistic regression analysis showed that there were significant associations between self-medication and payment of the mother's medical fees by employers, severity of diseases as well as the mother's educational level. (Peng, Parton, Tong, 2000)

1.2.3.2 Self-medication practice of antibiotic in Khartoum city:

It is estimate the prevalence of self medication with antibiotics and antimalarials in Khartoum State, Sudan and evaluates factors associated with self medication. A pre-tested questionnaire was used to collect data from a sample of 600 households, (1750 adult persons), selected from three cities in Khartoum State, Sudan, using a multistage stratified clustered sampling.

Results:

One thousand two hundred and ninety three (73.9%) of the study population had used antibiotics or antimalarials without a prescription within one month prior to the study. Eight hundred and forty one (48.1%) of the respondents agreed that they have used antibiotics, 43.4% used antimalarials, while 17.5% used both. Self medication with either antibiotics/

antimalarials was found to be significantly associated with age, income, gender and level of education. Overall, self medication with any antibiotics or antimalarials was least common among the more than or equal 60 years compared to youngest age group and most common among the female gender the middle income group and the university graduates. Self medication with antibiotic was found to be significantly higher among females; middle aged respondents aged 40-59 compared to younger respondents. Lower income and higher level of education was also found to be significantly associated with the increase risk of self medicating with antibiotic. Increase risk for self medication with antimalarials were, however, found to be significantly associated with male gender and younger age group of <40 years and middle income earners and less educated respondents. The main reason that was indicated for the self-medication was financial constraints. The main source of medicines was the private pharmacies, which were regarded as a cheaper alternative to other primary healthcare sources. The prevalence of self-medication with antibiotics/antimalarials in Khartoum State, Sudan is alarmingly high. Self medication behaviour varies significantly with a number of socio-economic characteristics. Given the growing global resistance for antibiotic and documented health issues related to inappropriate use of such drugs, our findings has major public health policy implications for countries like Sudan. (Awad, *et al,* 2005)

1.2.3.3 Self-medication practice of antibiotic in Europe:

Antibiotic drug resistance is a rapidly increasing global problem, and prevalence varying widely among countries. Prevalence of resistance is positively correlated with prescribed outpatient drug use on a national level. However, actual consumption of drugs may also include self-medication, i.e., using drugs obtained without prescription. Other sources of self-medication may include leftover drugs from treatment courses prescribed earlier or drugs obtained from relatives or friends. To date, the information on self-medication with antibiotic drugs in the industrialized world is limited.

From a statistical date of a survey which has been done in 19 European countries: Austria, the Netherlands, Sweden, United Kingdom, Ireland, Denmark, Italy, Malta, Luxembourg, Belgium, Spain, Israel, Romania, Czech Republic, Slovakia, Lithuania, Slovenia, Croatia, and Poland. The aim of this study was to estimate and compare the prevalence of actual self-

medication and at risk for self-medication with antibiotic drugs in participating countries. A total of 15,548 subjects were participated in this survey.

Rates of antibiotic drug self-medication among the European regions suggests that cultural and socioeconomic factors play a role, as do disparities in health care systems such as reimbursement policies, access to health care, and drug dispensing policies. Another factor is the acquisition of antibiotic drugs from pharmacies without prescription, which occurred most frequently in eastern European countries. Although over-the-counter sale of antibiotic drugs is illegal in all participating countries, there is clearly a need to enforce the law in some countries.

Antibiotic drug self-medication is a cause for concern in Europe. Even the lowest prevalence, 1 person per 1,000 respondents, implies that 10,000 persons in a population of 10,000,000 are self-medicating annually. (Theo, *et al,* 2013)

1.2.3.4 Self-medication practice of antibiotic in Abu Dhabi:

Self-medication with antibiotics may increase the risk of inappropriate use and the selection of resistant bacteria. The objective of the study was to estimate the prevalence of self-medication with antibiotics in Abu Dhabi. A validated, self-administered questionnaire was used to collect data. Data were analyzed using descriptive statistics, and the chi-square test when applicable. One thousand subjects were invited to participate in the study. Eight hundred sixty questionnaires were completed, with a respondent rate of 86%, consisting of 66% males and 34% females. The results of this study confirm that antibiotic self-medication is a relatively frequent problem in Abu Dhabi. Interventions are required in order to reduce the frequency of antibiotic misuse. (Abasaeed, *et al,* 2009)

1.2.4 Reason for self medication:

Self medication is very common thing in our society. Urge of self care, feeling of sympathy towards family members in sickness, lack of health services, poverty, ignorance, misbelieves, extensive advertisement and availability of drugs in other than drug shops are responsible for growing trend of self medication. Self-medication has been an issue quite common today whereby everyone is their own doctors. We have come to the point whereby either due to economic, and both internal and external factors we go to the pharmacy shops and buy drugs

that we think will help us get better quickly and avoid going to the hospital and meeting the doctor.

Why people self medicated to their children:

Parents who self-medicate their children are more likely than adults who medicate themselves to say they do so because the illness isn't serious enough to warrant a visit to the doctor (88% parents of children under 18 vs. 78% adults in general)

- Parents are also more likely than adults in general to believe that non-prescription Medications are just as effective as prescription drugs.
- Adults who self-medicate are more likely than parents who medicate their children to say they do so in order to save money (70% adults in general vs. 57% parents of children under 18) or avoid a trip to doctor's office (78% adults in general vs. 65% parents of children under 18). (Partha, Shenoy,Shankar,2002)

1.2.5 Risk of self medication:

It is very common in developing countries for people to developed distrust in going to doctors for treatment. This is not surprising considering the vast array of treatment which can be found at local facilities. It can vary from excellent to absolutely appalling. Educated people can easily fall into a bad habit in Bangladesh of self prescribing and self treating. This is an extremely dangerous practice. So in short, it is very prudent for one to get a prescription from a health professional before going to buy any drug over the counter. Some of the risks of self-medication include the following:

- The patient's diagnosis maybe is wrong; whatever they think is wrong with them could be wrong and so they might buy a drug that is not for the current condition, but for another.
- When we use over the counter, you are basically wasting the time you would have used to consult a medical professional, which could aggravate the disease condition. This is because when we will take some pills, e.g. painkillers and you will feel better, but only for a while and so the time you would have used to go to see and expert will be wasted by self-medication.

- One other risk factor is that the dosage may be wrong; since you have no medical prescription, it means that you are not informed on the dosage of the drug and will not know how to take it and for how long .

- These drugs that we buy from over the counter could contain some side-effects and sometimes some adverse effects that could be dangerous to our body and so the importance of seeking and experts opinion cannot be overemphasized.

- Finally, as far as antibiotic use is concerned, self-medication could promote bacterial resistance because these drugs should be prescribed after culture sensitivity test performed by a health professional to prevent resistance of the bacteria.
- Some antibiotic drugs and medicines or food may cause drug-to-drug and drug-food interactions and adversely affect the body. This may cause severe health problem and some it may be life-threatening.
- The most commonly misused medicines are painkillers. Analgesics can induce gastritis and can also increase risk of stroke by four times in patients with high BP.

In conclusion, self-medication should be discouraged and anyone that will go to buy medications without a doctor's prescription should be sent back to the doctor. (Carmel, 2012)

1.2.6 Benefit of self medication:

It is widely accepted that self-medication has an important role to play in health care and, with the continued improvement in people's education, general knowledge and socio-economic status; self-medication has been successfully integrated into many health care systems throughout the world. Self-medication products are those not requiring a medical prescription and which are produced, distributed and sold to consumers for use on their own initiative. Responsible self-medication can be used to prevent and treat symptoms and ailments that do not need medical consultation or oversight. This reduces pressure on medical services, especially when these are limited. For those populations living in rural or remote areas where access to medical services may be difficult, patients are able to control their own conditions to a greater extent. Only if the condition fails to respond, persists, or becomes more severe will the patient need to seek professional medical care. These benefits translate

into patient and consumer wellness and productivity, economic gain for employers, and cost savings to healthcare budgets through reduced medicine budget cost and reduced physician visits. (Carmel, 2012)

1.2.7 Factors influencing self-medication with antibiotics:

Factors which influence health-related behaviors exist in individuals, the community, institutions and nations. For example, patients demand for medicines, their beliefs about effectiveness and safety of medicines supply systems, quality of prescribing, implementation of essential medicines policies, reimbursement systems and global trade regulations are some of the relevant factors influencing people's behavior related to medicine use.

1.2.7.1 Socio-demographic and medical factors:

Despite a growing research interest in self medication, little information has been available about its major determinants. Individual self care in illness is shaped in the social environment – a major determinant of the type and amount of health care services used. The socio-demographic determinants are age, gender, occupation, education, marital status, religion, race, income and culture. The socio-medical factors may be related to the female reproductive role (pregnancy, breast feeding, and menstruation), psychiatric disturbance, medical states like asthma, migraine and so on. The younger age group engaged in self medication than the older ones. However, some studies revealed no association between age and self medication. Women have above average knowledge about antibiotics and risks of self medication compared to men. They also had a much higher probability of using antibiotics for self medication than men. Factors related to general health status and women's reproductive role influences gender differences in self medication. During breastfeeding, self medication was dictated by the mother and her infant's disorder. However, some studies revealed no association between gender and self medication. Various studies consistently showed that self medication was associated with educational level. For instance, there is a positive correlation between level of education and self medication. The trend of consulting patent medicine dealers for prescription decreases with acquisition of more formal education. While studies showed no correlation between self medication and occupational status, others revealed some association. For instance, employment status affected the pattern of OTC and

prescription drugs. The relationship between race and self medication had been documented from various studies. While some studies found little or no association between self medication and social status, others reported that among school aged subjects, social classes of parents has a direct relationship with drug consumption among their children. The influence of culture is common in health related states. (EdelmanI, OkekeA, Lamikanra, 1999)

1.2.7.2 Knowledge and beliefs about antibiotics:

Antibiotics have the credit of saving so many lives by killing the microbes causing certain diseases. In the disease of tuberculosis, antibiotics play an important role in eradicating the bacteria. To protect the patient from having side effects, doctors prescribe such antibiotics which suit person's body. But in many cases people think antibiotics is a special types of drugs that can be used in every disease conditions. (Chau, *et al,* 2008.)

1.2.7.3 Over the counter dispensing of antibiotics:

Normally in developing countries like Bangladesh, self-medication is a common practice as it provides a low-cost alternative for people who cannot afford the high cost of clinical service and also as many drugs are dispensed OTC without prescription from a registered or non registered medical practitioner. The source of antibiotics used for self medication can be formal drug providers, such as local pharmacy. We can divide informal drug providers in to four categories. The first is a shopkeeper who sells general antibiotics. The second one is a market trader who sells medicines along with other merchandise in a traditional market. The third is the local hockers who travel from village to village. The final category is a pharmacist who sells prescription-only medicines without asking for a prescription.

A country lack of regulatory enforcement of antibiotic provision leads t over-the-counter dispensing. It facilitates overuse of antibiotics including the use of non-prescribed antibiotics for self-medication.

1.2.8 Inappropriate Antibiotic use worldwide:

Antibiotics are important drugs, but they are over-prescribed and overused in self-medication for the treatment of minor disorders such as simple diarrhea, coughs and colds. If antibiotics are used too often in sub-optimal dosages, bacteria become resistant to them. This is a serious concern to public health policy-makers. The result is treatment failure when patients suffering from serious infections take antibiotics. People buy sub-optimal dosages because they cannot afford the full course prescribed, or because they are not aware of the need to complete antibiotic courses. Even in industrialized countries where antibiotic dispensing is better regulated, non-compliance with the prescribed regime is a common problem. People who have not understood the need to complete the course stop using antibiotics when the symptoms disappear, while others take an overdose as they think that this will lead to faster recovery.

From 40 to 50 percent of total antibiotic use is estimated to be inappropriate. "Inappropriate" can mean: The use of antibiotics when no health benefit is possible, such as to treat upper respiratory tract infections caused by viruses or, when the antibiotics will be dangerous things to our health because of self medication.

In much of the world antimicrobial drugs are sold without prescription or oversight by health-care professionals. The scale and effect of this practice is unknown. Systematically reviewed published works about non-prescription antimicrobials from 1970–2009, identifying 117 relevant articles. 35 community surveys from five continents showed that non-prescription use occurred worldwide and accounted for 19–100% of antimicrobial use outside of northern Europe and North America.

Studies by Lansang *et al*, (1990) and others highlight some of the problems with antibiotic use in the Philippines. Surveying 59 drug stores in Makati, Metro Manila, and the authors found that two-thirds of 1608 antibiotic transactions were made without prescriptions. They also found that for each antibiotic prescribed the customers purchased only 10 units (tablets or capsules) or less. In a rural setting in the Philippines, the authors found that 57% of 6404 antibiotic transactions were without a prescription. The median number of antibiotics

dispensed in a single visit was six tablets or capsules. These findings indicate widespread sub-optimal use of antibiotics in self-medication in the Philippines.

Another interesting study by Boomongkon and Colleagues (1999) reveals how concerned women are about chronic and recurrent uterus-related problems in Northeast Thailand. Women refer to symptoms, ranging from abdominal and lower back pain to vaginal discharge, itching, odor and rash, using the term *pen mot luuk* (literally "it's the uterus"). They fear that these problems will turn into cervical cancer if not treated, a perception inadvertently perpetuated by the cervical cancer education and screening programmers. Eighty percent of women surveyed reported self-medicating the last time they experienced symptoms. Two-thirds of them bought antibiotics, specifically under-dosages of two brands of tetracycline, Gaano and Hero. Tetracycline is medically inappropriate for many of the problems that women classify as *mot luuk*, but the manufacturer of Gaano appears to endorse its use by having a picture of a uterus on the package.

Previous researches in Jordan revealed different patterns of inappropriate antibiotics prescription and dispensing. Moreover, research has shown that the prevalence of self-medication with antibiotics in Jordan is alarmingly high. The prescribing practices of practitioners are not regulated and regulatory laws that prevent no prescribed dispensing of antibiotics to the adult do exist but are not enforced in community pharmacies. All of these factors highlight the need for exploring and tackling such health practices. (Morgan, *et al,* 2011)

1.2.8.1 Antibiotics in the community:

Antibiotics are a group of medicines that are used to treat infections caused by germs (bacteria and certain parasites). They do not work against infections that are caused by viruses - for example, the common cold or flu. Antibiotics are normally only prescribed for more serious bacterial infections - for example, pneumonia. When prescribed, it is important to take the entire course of antibiotics which helps to prevent resistance developing to that antibiotic. Most side-effects of antibiotics are not serious - for example, diarrhea, or mild stomach upset such as feeling sick (nausea). Although some people develop a serious allergy to some antibiotics, this is rare. Providers also play a role in driving inappropriate antibiotic

use in the community. Antibiotics are routinely prescribed for infections that are not caused by bacteria, such as for malaria, acute diarrhea, influenza, uncomplicated viral respiratory tract infections, and other viral infections. This may occur because of an absence of clinical training and guidelines on antibiotic treatment available to physicians, or because of a lack of diagnostics and trained personnel to conduct testing and identify the cause and susceptibility of the infection. Some antibiotics that are usually used in community:

- **Penicillins** - for example, phenoxymethylpenicillin, flucloxacillin and amoxicillin.
- **Cephalosporins** - for example, cefaclor, cefadroxil and cefalexin.
- **Tetracyclines** - for example, tetracycline, doxycycline and lymecycline.
- **Aminoglycosides** - for example, gentamicin and tobramycin.
- **Macrolides** - for example, erythromycin, azithromycin and clarithromycin
- **Sulfonamides and trimethoprim** - for example, co-trimoxazole
- **Metronidazole and tinidazole**.
- **Quinolones** - for example, ciprofloxacin, levofloxacin and norfloxacin. (Whitehall, 2016)

1.3 OTC Drugs:

Over-the-counter (OTC) drugs are medicines sold directly to a consumer without a prescription, from a healthcare professional, as compared to prescription drugs, which may be sold only to consumers possessing a valid prescription. These medications come in a variety of forms, including capsules, powders, tablets, and liquids. These drugs are often located on shelves in pharmacies with easy access by patients, but may also be located in non-pharmacy outlets, such as grocery stores, convenience marts and large discount retailers. In the U.S., there are more than 80 classes of OTC drugs, ranging from allergy medicines to pain relievers to weight loss products. Taking OTC medicines still has risks. Some interact with other medicines, supplements, foods or drinks. Others cause problems for people with certain medical conditions. If you're pregnant, talk to your health care provider before taking any medicines. (Kennedy, 1996)

1.3.1 Regulation in countries for OTC drugs:

1.3.1.1 OTC Drug Regulation in United state:

Over-the-counter (nonprescription) drug products play an increasingly vital role in America's health care system. OTC drugs are defined as drugs that are safe and effective for use by the general public without seeking treatment by a health professional. In united state OTC drugs mainly regulated by FDA.

FDA's review of OTC drugs is primarily handled by CDER's Office of Drug Evaluation IV. The Nonprescription Drug Advisory Committee meets regularly to assist the agency in evaluating issues surrounding these products. This committee has played a major role in the growth of prescription to OTC switches in recent years. Because there are over 300,000 marketed OTC drug products, FDA reviews the active ingredients and the labeling of over 80 therapeutic classes of drugs, for example analgesics or antacids, instead of individual drug products. (Kaufman, Kelly, Lynn *et al,* 2002)

1.3.1.2 OTC Drug Regulation in Canada:

Normally in order to market an over-the-counter medication in Canada, the product must receive a Drug Identification Number (DIN) from Health Canada.

Before an over-the-counter medication can be marketed in Canada, it must undergo pre-market review by Health Canada's Therapeutic Products Directorate where it will be assessed for safety, efficacy and quality. Evidence demonstrating this must be contained in a Drug Application form. Medicines that meet the required criteria will be authorized for sale and issued a DIN.

In Canada, there are three drug schedules:
Schedule 1: Require a prescription for sale and are provided to the public by a licensed pharmacist.

Schedule 2: Do not require a prescription, but require an assessment by a pharmacist prior to sale. These drugs are kept in an area of the pharmacy where there is no public access and may also be referred to as "behind-the-counter" drugs.

Schedule 3: Do not require a prescription, but must be kept in an area under the supervision of a pharmacist. These drugs are kept in an area of the retail outlet where self-selection is possible, but a pharmacist must be available to assist in the self-selection of medication if required.

Once assessed by Health Canada, the product label will bear an 8-digit drug identification number, preceded by the letters "DIN". The DIN on the label will inform the public that the product has been reviewed by Health Canada for safety, efficacy, health claims and quality. (Consumer Health Product Canada, 2012.)

1.3.1.3 OTC Drug Regulation in United Kingdom:

In the UK, the manufacture and supply of over-the-counter (OTC) medicines is tightly regulated.

Products are subject to strict licensing procedures as laid down by the Medicines Act 1968 and EU legislation which can over-ride UK legislation. These are enforced by the Medicines and Healthcare products Regulatory Agency (MHRA) and the Commission on Human Medicines (CHM) and in Europe, the European Medicines Agency (EMA) and the Committee for Human Medicinal Products (CHMP).

A product can only be sold if it has a Marketing Authorization (MA). To be granted a Marketing Authorization, the applicant company has to provide evidence to prove to MHRA that the product meets all the necessary requirements for safety, efficacy and quality. (Jonathan, Voulvoulis, 2005)

1.3.2 OTC drugs:

Some examples of OTC drug that is available and used by patients:

- **Antacids-** Axid AR**,** Gaviscon chew tab & liquid**,** Gaviscon Extra Strength**,** Maalox, Prilosec OTC, Rolaid, Tagamet, Zantac (Renitidine HCL)
- **Cough Suppressant**- Delsym, Pediacare, Robitussin, Triaminic, Tusca, Tulsi
- **Laxatives-** Benefiber**,** Bisacodyl**,** Colace**,** Fiber Choice.
- **Nasal Allergy Agents-** Benadryl**,** Claritin**,** Nasalcrom**,** Zyrtec.
- **Cough /Cold/ Allergy Combinations**- Advil Cold & Sinus, Benadryl-D Allergy & Sinus. Claritin-D, Coricidin HBP Chest Congestion
- **Pain and Fever**- Aspirin, Paracetamol (Acetaminophen) (Drug. Com,2016)

1.4 Prescription Drugs:

A prescription drug (also prescription medication or prescription medicine) is a pharmaceutical drug that legally requires a medical prescription to be dispensed. In contrast, over-the-counter drugs can be obtained without a prescription.

To dispense controlled substances, a pharmacist must know the requirements for a valid prescription which are described in this section. A prescription is an order for medication which is dispensed to or for an ultimate user. A prescription is not an order for medication which is dispensed for immediate administration to the ultimate user (i.e., an order to dispense a drug to an inpatient for immediate administration in a hospital is not a prescription).

A prescription for a controlled substance must be dated and signed on the date when issued. The prescription must include the patient's full name and address, and the practitioner's full name, address, and DEA registration number.

The prescription must also include:

1. Drug name
2. Strength

3. Dosage form
4. Quantity prescribed
5. Directions for use
6. Number of refills authorized (if any) (Drug Enforcement Administration, 2016)

1.4.1 Regulation in countries for prescription drugs:

1.4.1.1 Prescription drugs regulation in United State:

The U.S. Food and Drug Administration (FDA) On January 24, 2006, issued final regulations governing the content and format of prescribing information (PI) for human drug and biological products. The rule is commonly referred to as the "**Physician Labeling Rule**" (PLR) because it addresses prescription drug labeling that is used by prescribers and other health care providers. The goal of the PLR content and format requirements is to enhance the safe and effective use of prescription drug products by providing health care providers with clear and concise PI that is easier to access, read, and use. The PLR format also makes PI more accessible for use with electronic prescribing tools and other electronic information resources. (David, *et al,* 2002)

1.4.1.2 Prescription drugs regulation in United Kingdom:

The United Kingdom the Medicines Act 1968 and Prescription Only Medicines (Human Use) Order 1997 contain regulations that cover the supply of sale, use and production of medicines.

There are three categories of medicine:

- Prescription-only medicines, which can be sold by a pharmacist if prescribed by a prescriber.
- Pharmacy medicines, which may be sold by a pharmacist without prescription.
- General sales list medicines that may be sold without a prescription in any shop.

Medicinal products on prescription only:

- No person shall sell by retail, or supply in circumstances corresponding to retail sale, a medicinal product of a description, or falling within a class, specified in an order

under this section except in accordance with a prescription given by an appropriate practitioner.

- No person shall administer (otherwise than to himself) any such medicinal product unless he is an appropriate practitioner or a person acting in accordance with the directions of an appropriate practitioner. (Jonathan, Voulvoulis, 2005)

1.5 Disease of Children:

1.5.1.1 Pneumonia:

Pneumonia is (infection of the lung alveoli), as well as infections affecting the airways such as acute bronchitis and bronchiolitis, influenza and whooping cough. They are a leading cause of illness and death in children and adults across the world. The importance of lower respiratory infections may be underestimated. *Pneumonia* (from the Greek *pneuma*, "breath") is a potentially fatal infection and inflammation of the lower respiratory tract (i.e., bronchioles and alveoli) usually caused by inhaled bacteria. (Virgil, Condon, 1991)

Types of Pneumonia:

- Bacterial Pneumonia
- Viral Pneumonia

1.5.1.2 Pathophysiology:

Pneumonia is most commonly caused by aspiration or inhalation of microorganisms through the nasopharynx or oropharynx. Microorganisms are usually trapped in the mucous-producing cells and cilia that line the upper airway. Factors that can impair the lungs' first line of defense include suppressed cough reflex, decreased ciliary action, decreased activity of phagocytic cells, and the accumulation of secretions. If the microorganism gets past the upper airways line of defense, the next line of defense is the airway epithelial cells which contain alveolar macrophages. Alveolar macrophages release cytokines and cause widespread inflammation in the lungs in an attempt to activate the immune response. The products of inflammation (inflammatory mediators, immune complexes) can damage the lung tissue and cause the terminal bronchioles to fill with infectious debris and exudates.

Some microorganisms also release toxins which can cause further damage to the alveolar walls. Accumulation of exudates can leads to alveolar edema resulting in dyspnea and hypoxemia.

Most of the time, our nose and airways filter germs out of the air we breathe. This keeps our lungs from becoming infected. But germs sometimes find a way to enter the lungs and cause infections. This is more likely to occur when:

- Our immune system is weak.
- A germ is very strong or present in large amounts.
- Our body fails to filter germs out of the air we breathe.

When the germs that cause pneumonia reach our lungs, the lungs' air sacs (alveoli) become inflamed and fill up with fluid. This causes the symptoms of pneumonia, such as a cough, fever, chills, and trouble breathing.

When we have pneumonia, oxygen may have trouble reaching our blood. If there is too little oxygen in our blood, our body cells can't work properly. Because of this and the risk of the infection spreading through the body, pneumonia can cause death.

Pneumonia affects our lungs in two ways. It may be in only one part, or lobe, of lung, which is called lobar pneumonia. Or, it may be widespread with patches throughout both lungs, which is called bronchial pneumonia (or bronchopneumonia). (Bartlett, Marrie, Thorner, 2013)

1.5.1.3 Treatment:

1.5.1.3.1 Treating Bacterial Pneumonia:

Antibiotics are used to treat this type of pneumonia. Antibiotics should be taken as directed. If you stop taking the antibiotics before treatment is complete, the pneumonia may return. Most people will improve after one to three days of treatment.

1.5.1.3.2 Treating Viral Pneumonia:

Antibiotics are useless if a virus is the cause of pneumonia. However, certain antiviral drugs can help treat the condition. Symptoms usually clear within one to three weeks.

- Streptococcus pneumonia Penicillin-susceptible strains: penicillin G, amoxicillin
- Penicillin-resistant strains: macrolides, cephalosporins, doxycycline, fluoroquinolones, clindamycin, vancomycin, linezolid. (Hoffken, Niederman, 2002)

1.5.2.1 Fever:

Fever is the temporary increase in the body's temperature in response to a disease or illness.

A child has a fever when the temperature is at or above one of these levels:

- 100.4°F (38°C) measured in the bottom (rectally)
- 99.5°F (37.5°C) measured in the mouth (orally)
- 99°F (37.2°C) measured under the arm (axillary)

An adult probably has a fever when the temperature is above 99 - 99.5°F (37.2 - 37.5°C), depending on the time of day.) (Maurin, Roult, 1999)

1.5.2.2 Pathophysiology:

Body temperature is determined by the balance between heat production by tissues, particularly the liver and muscles, and heat loss from the periphery. Normally, the hypothalamic thermoregulatory center maintains the internal temperature between 37° and 38° C. Fever results when something raises the hypothalamic set point, triggering vasoconstriction and shunting of blood from the periphery to decrease heat loss; sometimes shivering, which increases heat production, is induced. These processes continue until the temperature of the blood bathing the hypothalamus reaches the new set point. Resetting the hypothalamic set point downward (eg, with antipyretic drugs) initiates heat loss through sweating and vasodilation. The capacity to generate a fever is reduced in certain patients (eg, alcoholics, the very old, the very young).

Pyrogens are substances that cause fever. Exogenous pyrogens are usually microbes or their products. The best studied are the lipopolysaccharides of gram-negative bacteria (commonly called endotoxins) and *Staphylococcus aureus* toxin, which causes toxic shock syndrome. Exogenous pyrogens usually cause fever by inducing release of endogenous pyrogens (eg, IL-1, tumor necrosis factor [TNF]-α, interferon-γ, IL-6), which raise the hypothalamic set point. Prostaglandin E_2 synthesis appears to play a critical role. (Johnson, Rowsey, 1997)

1.5.2.3 Types of fever:

- **Continuous fever:** Where the temperature remains above normal throughout a 24-hour period and does not fluctuate more than 1° Celsius in 24 hours.
- **Remittent fever:** The temperature remains above normal throughout the day and fluctuates more than 2° Celsius in 24 hours.
- **Pel Ebstein fever:** The temperature may take 3 days to rise, remain high for 3 days and then remits over 3 days. The patient could then be apyrexial for 9 days.
- **Intermittent fever:** In a 24 hour period the temperature is only present for some hours of the day and the rest of the time is normal. .
- **Septic fever:** A very high temperature which doesn't improve with antipyretics
- **Cyclical recurrent fevers** or **periodic fevers.** (Song, *et al,* 1984)

1.5.2.4 Treating fever:

- Fever usually makes a person feel uncomfortable, and steps may be taken to reduce the fever, by taking age-appropriate medicine, such as paracetamol or ibuprofen, but never aspirin in under-16s.
- Other home care treatments for fever:
- Drink plenty of water or other clear fluid. Iced drinks or ice lollies may have a soothing effect.
- Wear lightweight clothing and don't use blankets and duvets in bed to avoid getting too warm
- Make sure the temperature in the room is comfortable and let fresh air in
- Rest and avoid heavy activity. (Rbert, Talcltt,1999)

1.5.3.1 Common Cold:

The common cold is caused by many different viruses. The common cold is transmitted by infected airborne droplets or by direct contact with infected secretions. Being in cold weather does not cause the common cold.

- Symptoms of the common cold include cough, sore throat, and sneezing, runny nose.

1.5.3.2 Treatment:

- **Pain relievers**: For fever, sore throat and headache, many people turn to acetaminophen (Tylenol, others) or other mild pain relievers. Use acetaminophen for the shortest time possible and follow label directions to avoid side effects.
- **Decongestant nasal sprays**: Adults can use decongestant drops or sprays for up to five days. Prolonged use can cause rebound symptoms. Children younger than six shouldn't use decongestant drops or sprays.
- **Cough syrups**: The Food and Drug Administration (FDA) and the American Academy of Pediatrics strongly recommends against giving OTC cough and cold medicines to children younger than age 4. There's no good evidence that these remedies are beneficial and safe for children. (Keiser, *et al,* 1999)

1.5.4.1 Angina & Acute tonsillitis:

Angina and acute tonsillitis are acute inflammations of the palatine tonsils. They occur readily in children and young adults. Tonsillitis is an infection and swelling of the tonsils, which are oval-shaped masses of lymph gland tissue located on both sides of the back of the throat. The tonsils normally help to prevent infections. They act like filters to trap bacteria and viruses entering the body through the mouth and sinuses. The tonsils also stimulate the immune system to produce antibodies to help fight off infections. Anyone of any age can have tonsillitis; however, it is most common in children between the ages of five and 10 years. (Brook, Foot, slots, 2016)

1.5.4.2 Causes and symptoms:

Tonsillitis is caused by viruses or bacteria that cause the tonsils to swell and become inflamed. A mild or severe sore throat is one of the first symptoms of tonsillitis. Symptoms can also include fever, chills, tiredness, muscle aches, earache, pain or discomfort when swallowing, and swollen glands in the neck. Very young children may be fussy and stop eating. When a doctor or nurse looks into the mouth with a flashlight, the tonsils may appear swollen and red. Sometimes, the tonsils will have white or yellow spots or flecks or a thin coating. Symptoms are usually last four to six days.

1.5.4.3 Treatment:

If tonsillitis is caused by a bacterial infection, our doctor will prescribe a course of antibiotics. Penicillin taken by mouth for 10 days is the most common antibiotic treatment prescribed for tonsillitis caused by group a streptococcus. If our child is allergic to penicillin, our doctor will prescribe an alternative antibiotic.(Bisno, 1996)

1.5.5.1 Nasal congestion:

Nasal congestion is another term for a stuffy nose. It is often a symptom of another health problem, such as a sinus infection, but it may also be caused by the common cold. Nasal congestion is marked by:

- a stuffy or runny nose
- sinus pain
- mucus buildup
- swollen nasal tissues

Home remedies may be enough to alleviate nasal congestion, particularly if it is brought on by the common cold. However, if you experience chronic (long-term) congestion, we should seek medical treatment.

1.5.5.2 Treatment:

Medications used to treat nasal congestion include:

- Oral antihistamines to treat allergies, such as loratadine (Claritin) and cetirizine (Zyrtec)
- Antihistamine-containing nasal sprays, such as azelastine (Astelin, Astepro)
- Nasal steroids, such as mometasone (Asmanex Twisthaler) or fluticasone (Flovent Diskus, Flovent HFA)
- Antibiotics (for infections, such as sinusitis)
- Over-the-counter or prescription strength decongestants, such as Sudafed. (Chincjilli, *et al,* 1998)

1.5.6.1 Allergic rhinitis:

Allergic rhinitis is a diagnosis associated with a group of symptoms affecting the nose. These symptoms occur when we breathe in something we are allergic to, such as dust, animal dander, or pollen. Symptoms can also occur when we eat a food that we are allergic to. This article focuses on allergic rhinitis due to plant pollens. This type of allergic rhinitis is commonly called hay fever or seasonal allergy.

1.5.6.2 Causes:

An allergen is something that triggers an allergy. When a person with allergic rhinitis breathes in an allergen such as pollen, mold, animal dander, or dust, the body releases chemicals that cause allergy symptoms**.** Hay fever involves an allergic reaction to pollen.

Plants that cause hay fever are trees, grasses, and weeds. Their pollen is carried by the wind. (Flower pollen is carried by insects and does not cause hay fever.) Types of plants that cause hay fever vary from person to person and from area to area.

The amount of pollen in the air can affect whether hay fever symptoms develop.

- Hot, dry, windy days are more likely to have a lot of pollen in the air.

- On cool, damp, rainy days, most pollen is washed to the ground.

Hay fever and allergies often run in families. If both of our parents have hay fever or other allergies, we are likely to have hay fever and allergies, too. The chance is higher if our mother has allergies. (Bauzarov, Stojanovska, 2011)

1.5.6.3 Treatments for allergic rhinitis include:

Antihistamine:

Medicines called antihistamines work well for treating allergy symptoms. They may be used when symptoms do not happen often or do not last long. Be aware of the following:

- Many antihistamines taken by mouth can be bought without a prescription.
- Antihistamine nasal sprays work well for treating allergic rhinitis

Corticosteroids:

- Nasal corticosteroid sprays are the most effective treatment for allergic rhinitis.
- They work best when used nonstop, but they can also be helpful when used for shorter periods of time.
- Corticosteroid sprays are generally safe for children and adults. (Bauzarov, Stojanovska, 2011)

1.5.7 Diarrhea:

Diarrhea is having more frequent, loose, water which may be referred to as 'stools'. Almost everyone has diarrhea at some point in his or her life, including on holiday abroad, called traveller's diarrhea.

Classification:

1. Acute- if 2 weeks (less than 2 weeks)
2. Persistent- if 2 to 4 weeks
3. Chronic- if 4 weeks in duration (more than 4 weeks)

1.5.7.1 Causes:

Many different problems can cause diarrhea. Here are the major causes:

You are most likely to come down with diarrhea after coming into contact with these infectious organisms and agents:

- A virus, such as rotavirus, winter vomiting disease (Norwalk virus or norovirus), enterovirus, or a hepatitis virus.
- A bacterium, such as *E. coli*, salmonella, shigella, C.diff (clostridium), or cholera (*Vibrio cholerae).* (Breese, *et al*, 2006)

1.5.7.2 Treatment:

If case is mild, we may not need to take anything. Or can take an over-the-counter medicine such as bismuth subsalicylate (Pepto-Bismol, Kaopectate) or loperamide (Imodium) which are available as liquids or tablets. Follow the instructions on the package.

If have itching, burning, soreness, or pain in rectal area because have a lot of bowel movements, try these tips to feel better:

- Take a warm bath. Afterwards, pat the area dry (do not rub) with a clean, soft towel.
- Use a hemorrhoid cream or try white petroleum jelly. (Breese, *et al*, 2006)

1.6 Antibiotic Drugs:

Antibiotics are a group of medicines that are used to treat infections caused by germs (bacteria and certain parasites). A parasite is a type of germ that needs to live on or in another living being (host). Antibiotics are sometimes called antibacterial or antimicrobials. Antibiotics can be taken by mouth as liquids, tablets, or capsules or they can be given by injection. Usually, people who need to have an antibiotic by injection are in hospital because they have a severe infection. Antibiotics are also available as creams, ointments, or lotions to apply to the skin to treat certain skin infections. (Whitehall, 2014)

1.6.1: Classification of antibiotics:

Antibiotics grouping according to the mechanism:

- **Cell wall synthesis:** Penicillins, Cephalosporin, Vancomycine, carbapenems, Polymycine and Bacitracin.
- **Protein synthesis inhibitors:** Tetracycline, Chloramphenicol, Linezolid
- **DNA synthesis inhibitors:** Fluroquinolones, Metronidazole.
- **RNA synthesis inhibitor:** Rifampin
- **Folic acid synthesis inhibitors:** Suifonamide, Trimethoprim
- **Mycolic acid synthesis inhibitor:** Isonizid. (Whitehall, 2014)

1.7 Current Status of Worldwide Antibiotic Resistance:

Antimicrobial resistance is resistance of a microorganism to an antimicrobial drug that was originally effective for treatment of infections caused by it.

Resistant microorganisms (including bacteria, fungi, viruses and parasites) are able to withstand attack by antimicrobial drugs, such as antibacterial drugs (e.g. antibiotics), antifungal, antiviral, and antimalarials, so that standard treatments become ineffective and infections persist, increasing the risk of spread to others.

The evolution of resistant strains is a natural phenomenon that occurs when microorganisms replicate themselves erroneously or when resistant traits are exchanged between them. The use and misuse of antimicrobial drugs accelerates the emergence of drug-resistant strains. Poor infection control practices, inadequate sanitary conditions and inappropriate food-handling encourage the further spread of antimicrobial resistance.

- Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi.

- It is an increasingly serious threat to global public health that requires action across all government sectors and society.

- Antimicrobial resistance is present in all parts of the world. New resistance mechanisms emerge and spread globally.
- WHO reported a gradual increase in resistance in 2012 to HIV drugs, albeit is not reaching critical levels. Since then, further increases in resistance to first-line treatment drugs were reported, which might require using more expensive drugs in the near future.
- In 2013, there were about 480 000 new cases of multidrug-resistant tuberculosis (MDR-TB). Extensively drug-resistant tuberculosis (XDR-TB) has been identified in 100 countries. MDR-TB requires treatment courses that are much longer and less effective than those for non-resistant TB.
- There are high proportions of antibiotic resistance in bacteria that cause common infections (e.g. urinary tract infections, pneumonia, bloodstream infections) in all regions of the world. A high percentage of hospital-acquired infections are caused by highly resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) or multidrug-resistant Gram-negative bacteria.
- Treatment failures due to resistance to treatments of last resort for gonorrhea (third-generation cephalosporin) have been reported from 10 countries. Gonorrhea may soon become untreatable as no vaccines or new drugs are in development.
- Patients with infections caused by drug-resistant bacteria are generally at increased risk of worse clinical outcomes and death, and consume more health-care resources than patients infected with the same bacteria that are not resistant. (Marshall & Levy, 2004)

1.7.1: The difference between antibiotic and antimicrobial resistance:

Antibiotic resistance refers specifically to the resistance to antibiotics that occurs in common bacteria that cause infections. Antimicrobial resistance is a broader term, encompassing resistance to drugs to treat infections caused by other microbes as well, such as parasites (e.g. malaria), viruses (e.g. HIV) and fungi (e.g. Candida). (Marshall & Levy, 2004)

1.7.2: Antimicrobial resistance a global concern because:

New resistance mechanisms emerge and spread globally threatening our ability to treat common infectious diseases, resulting in death and disability of individuals who until recently could continue a normal course of life.

- Without effective anti-infective treatment, many standard medical treatments will fail or turn into very high risk procedures. (Marshall & Levy, 2004)

1.7.2.1: Antimicrobial resistance kills:

- Infections caused by resistant microorganisms often fail to respond to the standard treatment, resulting in prolonged illness, higher health care expenditures, and a greater risk of death.
- As an example, the death rate for patients with serious infections caused by common bacteria treated in hospitals can be about twice that of patients with infections caused by the same non-resistant bacteria. For example, people with MRSA (methicillin-resistant *Staphylococcus aureus*, another common source of severe infections in the community and in hospitals) are estimated to be 64% more likely to die than people with a non-resistant form of the infection. (Cohen, 1992)

1.7.2.2: Antimicrobial resistance hampers the control of infectious diseases:

- Antimicrobial resistance reduces the effectiveness of treatment; thus patients remain infectious for a longer time, increasing the risk of spreading resistant microorganisms to others. For example, the emergence of *Plasmodium falciparum* multidrug resistance, including resistance to ACTs in the Greater Mekong sub region is an urgent public health concern that is threatening global efforts to reduce the burden of malaria.
- Although MDR-TB is a growing concern, it is still largely under-reported, compromising control efforts. (Cohen, 1992)

1.7.2.3 Antimicrobial resistance increases the costs of health care:

- When infections become resistant to first-line drugs, more expensive therapies must be used. A longer duration of illness and treatment, often in hospitals, increases health care costs as well as the economic burden on families and societies. (Cohen, 1992)

1.7.2.4: Antimicrobial resistance jeopardizes health care gains to society

- The achievements of modern medicine are put at risk by antimicrobial resistance. Without effective antimicrobials for prevention and treatment of infections, the success of organ transplantation, cancer chemotherapy and major surgery would be compromised. (Cohen, 1992)

1.7.3 High-income regions and countries:

1.7.3.1: Antibiotic resistance rate in America:

The WHO Region of the Americas comprises all of North, Central and South America and the Caribbean islands. All except three of the countries that responded to the request for information are lower- to middle-income countries.

The Regional Office recognized the serious threat posed by antimicrobial resistance in the mid-1990s and undertook a step to improve surveillance and to control antimicrobial resistance in the Americas by strengthening laboratory capacity to identify bacteria and test for antimicrobial susceptibility

For the survey, countries identified acute respiratory infections (including pneumonia and TB), gastroenteritis and dengue fever as their main public health challenges. Inappropriate use of antimicrobial medicines is a major driver of antimicrobial resistance in the Region, with self-medication, easy access to these medicines and lack of awareness in several important sectors.

Normally in the United States, has estimated that more than 2 million infections and 23,000 deaths are due to antibiotic resistance. Resistance of *Streptococcus pneumoniae* invasive isolates to antibiotics has declined in the United States, from 34 to 17 percent from 1999 to 2013 for penicillin, and from 15 to 8 percent from 1999 to 2012 for third-generation cephalosporin. Among *E. coli* and *K. pneumoniae* isolates, resistance to third-generation cephalosporin and fluoroquinolones increased steadily. This report covers bacteria causing severe human infections and the antibiotics used to treat those infections. In addition, Candida, a fungus that commonly causes serious illness, especially among hospital patients, is included because it, too, is showing increasing resistance to the drugs used for treatment. (Neuhause , Rydman, Weinstein, 2003)

1.7.3.2: Antibiotic resistance rate in Canada:

Antibiotic resistance in Canada:

- In 2013, resistance to antimicrobials (cephalosporin) used for treating gonorrhea was present in 3.9% of infections, raising concerns that treatment with these antimicrobials may not be effective.
- Since 2009, methicillin-resistant *Staphylococcus aureus* (MRSA) infection rates have been decreasing, especially in hospital settings. However, current MRSA infection rates continue to exceed those observed in the early 2000s, and MRSA remains a significant cause of infection.
- *Clostridium difficile* infection rates in hospital settings have remained stable since 2007.
- Carbapenems are broad-spectrum antimicrobials usually reserved for use in more severe infections. The annual overall rate of infection resistant to carbapenems (specifically Carbapenem-Resistant *Enterobacteriaceae*) has approximately remained the same.
- Vaccination programs against *Streptococcus pneumoniae* have helped reduce the rate of infection caused by an important multidrug-resistant strain of the bacteria.
- In 2013, resistant *Salmonella* bacteria caused 759 reported human cases of disease (out of a total of 2,987 human *Salmonella* cases). (Bell, Diekema, Jones, Pfaller,1999)

1.7.3.3: Antibiotic resistance rate in Australia:

Australia, in 2013, 41 percent of *E. faecium* bloodstream isolates were vancomycin resistant. Among *E. coli* isolates, 10 percent were fluoroquinolone resistant and 8 percent were third-generation cephalosporin resistant. Among *K. pneumoniae* isolates, 5 percent were fluoroquinolone resistant and 6 percent were third-generation cephalosporin resistant. Carbapenem resistance was observed in less than 1 percent of *K. pneumoniae* and *E. coli* isolates. (Cove, *et al* 2001)

1.7.4 Low and middle-income regions and countries:

1.7.4.1: Antibiotic resistance rate in Africa:

The turn of the century, the World Health Organization estimated that infections accounted for 45% of deaths in Africa and South-East Asia and that these diseases were responsible for 48% of premature deaths worldwide. Bacteria cause a significant proportion of infections in Africa. Unfortunately, in a remarkably short time, resistance to antibiotics has undermined the idealistic hope that bacterial infection would cease to be an important cause of death and disease. Indeed, antibiotic resistance increasingly compromises the outcome of many infections that were, until recently, treatable and remain the most common diseases in Africa. For example, as shown in resistant tuberculosis (TB) infections are highly prevalent in some African countries. High resistance rates can often be correlated to the absence of properly implemented control programs such as directly observed treatment, short-course (DOTS) schemes. In a survey conducted in an area of Cameroon that lacks a fully functional TB control program, multi-drug resistance TB was observed in 27.6% of the patients with a previous history of treatment .TB is a pertinent case in point because it is highly prevalent in many African and other developing countries but many other bacterial infections are severely compromised by resistance.

These include diseases caused by to Gram-negative enteric rods, respiratory infections, bacterial meningitis, sexually transmitted diseases as well as hospital acquired infections. Due to the widespread distribution of penicillinase-producing *Neisseria gonorrhea*, penicillin or ampicillin can no longer be employed in the empiric management of gonorrhea. The

prevalence of gonococcal resistance to affordable alternatives - such as tetracycline, thiamphenicol and spectinomycin - continues to rise and resistance to fluoroquinolones has emerged .The picture is similar with other organisms. Reports from different parts of Nigeria have observed temporal trends in the prevalence of resistance among enteric organisms, such as Escherichia coli and Shigella (Figure 1).

In multiple studies, resistance to commonly used antimicrobials, including trimethoprim-sulphamethoxazole (TMP-SMX, also known as cotrimoxazole), ampicillin, tetracycline and chloramphenicol has shown increasing prevalence in the last 15 years. These studies have consistently found low prevalence of resistance to nalidixic acid and the fluoroquinolones, however, an upward trend has recently been observed with these agents. Studies in other parts of the world, where fluoroquinolones are more commonly employed, have revealed that a routine use of this drug is often associated with a rapid increase in the proportion of resistant strains. The antibiotic paradox is also repeated in many other pathogen-human interactions, including antimalarial resistance in Plasmodium spp. and HIV antiretroviral resistance, as well as insecticide resistance in insect vectors. Lessons that can be learned from antibiotic resistance can be applied to these paradigms as well. (Ian, Friedland, Klugman, 1992)

1.7.4.2: Antibiotic resistance rate in Asia:

A total of 685 clinical *Streptococcus pneumoniae* isolates from patients with pneumococcal diseases were collected from 14 centers in 11 Asian countries from January 2000 to June 2001. The in vitro susceptibilities of the isolates to 14 antimicrobial agents were determined by the broth micro dilution test. Among the isolates tested, 483 (52.4%) were not susceptible to penicillin, 23% were intermediate, and 29.4% were penicillin resistant. Isolates from Vietnam showed the highest prevalence of penicillin resistance (71.4%), followed by those from Korea (54.8%), Hong Kong (43.2%), and Taiwan (38.6%).

The resistance of erythromycin were >32 mg/liter among isolates from Korea, Vietnam, China, Taiwan, Singapore, Malaysia, and Hong Kong. Isolates from Hong Kong showed the highest rate of ciprofloxacin resistance (11.8%), followed by isolates from Sri Lanka (9.5%), the Philippines (9.1%), and Korea (6.5%). (Bouchillon, *et al* , 2007)

1.8: Knowledge of antibiotics in parents:

Most parents stated that their physician was the main source of information regarding antibiotics, followed by their pharmacist; other sources, such as television, newspapers, and family members/friends accounted only for 2.8 % of parent's sources of information. However, 1.3 % of parents stated they never received any information from any of these sources. When parents were asked to discriminate between antibiotic products and other drugs, including analgesics, cough preparations and expectorants, and antipyretics, most parents (55.6 %) were able to identify that amoxicillin was an antibiotic, while only 3.1 %were able to identify that amoxicillin-clavulanic acid and cefuroxime, respectively, were antibiotics. Moreover 4.1% of parents identified ibuprofen, paracetamol, and cough preparations, respectively, as antibiotics. Normally parents are chose antibiotics for their child in different disease like URTI, fever, cough and diarrhea etc (74%). Sometimes parents ask doctor to prescribe antibiotics for their child (22%).

In particular, 24.7 % of parents used antibiotics as self-medication due to economic hardships or lack of time, while 50.6 % would give antibiotics to their child because they believed that symptoms (e.g., earache, fever, cold, cough) were not dangerous as much as necessary to pediatrician.(Bauchner, *et al* 2001)

CHAPTER -02

Literature Review

2. Literature review:

There have been many studies on self-medication of antibiotic and the knowledge about antibiotic use and resistance in different countries. A number of them are introduced below:

2.1 Self-Medication in Europe:

Self-medication with antibiotics occurs among the population in Europe, in particular in Southern and Eastern countries. The most common reasons for self-medication were colds and upper respiratory tract symptoms which are self limiting and mostly caused by viruses. This inappropriate use may contribute to antibiotic resistance which is reaching alarming levels in Southern and Eastern Europe. In total 1101 respondents were interviewed. Eleven respondents who failed to identify what was an antibiotic were excluded from the analyses. (Madge, *et al* 2008.)

2.2 Family self-medication and antibiotics abuse for children and juveniles in a Chinese city:

The identification and the determinants of self-medication and antibiotics abuse by parents treating their children aged between 2 and 18 over the previous year, an investigation was conducted in Hefei City, China in April, 1995. A total of 1596 students from a kindergarten, a primary school and a high school were included in the study, and 1459 completed questionnaires were collected (the response rate: 91.4%). The results showed the rate of parental self-medication for their children in the sample was 59.4%. It increased with children's age; about 51% of children had received parental self-medication on six or more occasions during the 1-year period and 32.8% on four to five occasions; there were associations between parental self-prescribers and sources of medicine and severity of disease. The rate of antibiotics abuse was 35.7%. Logistic regression analysis showed that there were significant associations between self-medication and payment of the mother's medical fees by employers, severity of diseases as well as the mother's educational level. (Peng, Parton, Tong, 2000)

2.3 Self-medication with antibiotics by the community of Abu Dhabi, United Arab Emirates:

Self-medication with antibiotics may increase the risk of inappropriate use and the selection of resistant bacteria Eight hundred sixty questionnaires were completed, with a respondent rate of 86%, consisting of 66% males and 34% females. Among the 860 participants, 56% reported the use of antibiotics within the last year. Amoxicillin was the antibiotic most commonly used (46.3%).In Abu Dhabi 44% people self medicated because of low knowledge about antibiotics. In there (28%) participants stored antibiotics at home. The results of this study confirm that antibiotic self-medication is a relatively frequent problem in Abu Dhabi. Interventions are required in order to reduce the frequency of antibiotic misuse. (Abasaeed, *et al* 2009)

2.4 Survey of non-prescribed use of antibiotics for children in an urban community in Mongolia:

The people who are participating caregivers 503 people, in that 71% were mothers; 42.3%. Some of caregivers had used non-prescribed antibiotics to treat symptoms in their child during the previous 6months. Symptoms commonly treated were cough (84%), fever (66%), nasal discharge (65%) and sore throat (60%). Amoxicillin was the most commonly used antibiotic (58%). Pharmacies were the main source (86%) of non-prescribed antibiotics. Non-prescribed use by mothers was significantly associated with keeping antibiotics at home.

The prevalence of non-prescribed antibiotic use for young children was high in Ulaanbaatar. Because such use leads to the spread of bacterial resistance to antibiotics and related health problems, our findings have important implications for public education and the enforcement of regulations regarding the sale of antibiotics in Mongolia. (Togoobaatar, *et al* 2010)

2.5 Self-medication with Antibiotic in Children in Sana'a City, Yemen:

The age group of the patients ranged from 0-15 years. In this 2000 patients interviewed, (60%) had taken an antibiotic in the last 15 days without a medical prescription. Respiratory (80%) and gastrointestinal (13%) symptoms were most frequently reported and (26%) patients used the previous prescription paper to obtain antibiotics, while 888(74%) obtained antibiotics from pharmacies and drug stores without any prescription required. Amoxicillin,

Trimethoprim-sulfamethoxazole and amoxicillin-clavulanic acid accounted for (85%) of the prescribed antibiotics. (Mohanna, 2010.)

2.6 The practice of self-medication for treatment of illnesses for under-five children by mothers in Ibadan, Nigeria:

The required ability of individuals to practice 'responsible self-medication' on minor ailments without medical practitioners' attention is demonstrably lacking among mothers of under-five children in Nigeria. There are few studies on mother's practice of responsible self-medication in Nigeria. Thus, this study was carried out to investigate the practice of self-medication among 226 mothers of under-five children in Ibadan, Nigeria. The study find that 53.4% mothers of under-five whose children fell sick two weeks before the survey applied self-medication as first action; 81.4% disclosed that they ever administered nonprescribed drugs for their children, 47.3% reportedly applied self-medication based on competence, while 19% were encouraged by family members to use non-prescribed drugs. Healthcare practitioners should involve household members in focused awareness on self-medication and its negative implications in order to encourage them to serve as change agents against the practice by mothers. (Adesanwo, Salami, 2015)

2.7 Knowledge, attitudes, and practices of parents in rural China on the use of antibiotics in children: a cross-sectional study:

The antibiotic knowledge study in China, 854 participating primary caregivers, 79% thought antibiotics could cure viral infections, and half believed that antibiotics could shorten the duration of upper respiratory tract infection. Parents reported a median of two hospital visits for their children during the previous 6 months, equal to the median number of antibiotic prescriptions received from physicians. Sixty-two percent of the parents had self-medicated their children with antibiotics were independently associated with self-medicating behavior. Low levels of knowledge on the use of antibiotics and a high prevalence of self-medicating children with antibiotics were observed among parents in rural China. Interventions for the rational use of antibiotics in children should focus on strengthening mass health education, improving effective communication between physicians and patients, and enforcing supervision of the sale of antibiotics in retail pharmacies. (Miao, *et al* 2014.)

CHAPTER – 03

Methodology

3. Methodology

3.1 Type of Study

This is a cross-sectional survey based study.

3.2 Study Population

In this study, parents were the study population, who self-medicated to their children for any diseases during last 6 months. The age group of children was 0-12 years.

3.3 Study design

This study involved a simple questionnaire based cross-sectional survey. Total 36 questions were divided into three segments.

3.4 Study period

The study was conducted from February 2016 to October 2016.

3.5 Study Area

The study was conducted in three different areas in Bangladesh. And we collected data from various place of:

1. Madhnagar
2. Naldanga

3.6 Sample size

There were 500 parents of children who participate in the survey. The question was filled up by father or mother or guardian of child.

3.7 Sampling Technique

In this study random sampling was followed.

3.8 Inclusion Criteria

The only inclusion criteria for the subjects were to be parent's of child.

3.9 Exclusion Criteria

The exclusion criteria for the subjects were not being a parent's child.

3.10 Data Collection Tools

The tools used for the survey were a questionnaire.

3.10.1 Questionnaire

The questionnaire comprised of questions regarding demographic information, child's disease and medication usage information, parental perception and their understanding of antibiotic use, and status of parental understanding of antibiotic resistance.

3.11 Data Collection method

The data was collected through questionnaire that is formed in English language. It is a questionnaire consists of multiple choice type questions. The data was collected by both face to face interview and by questionnaire supply.

3.12 Data Analysis

After collecting, the data were checked and analyzed with the help of Microsoft Excel 2007. The result was shown in bar, pie and column chart and different variables were calculated in percentages.

CHAPTER - 04

Result

4.1 Demographic Information

4.1.1 Parent filling up the questionnaire

Table 4.1.1: Parent filling up the questionnaire

Parent filling up questioner	Number	Percent
Father	114	23%
Mother	386	**77%**
others	**0**	**0%**
Total=500		

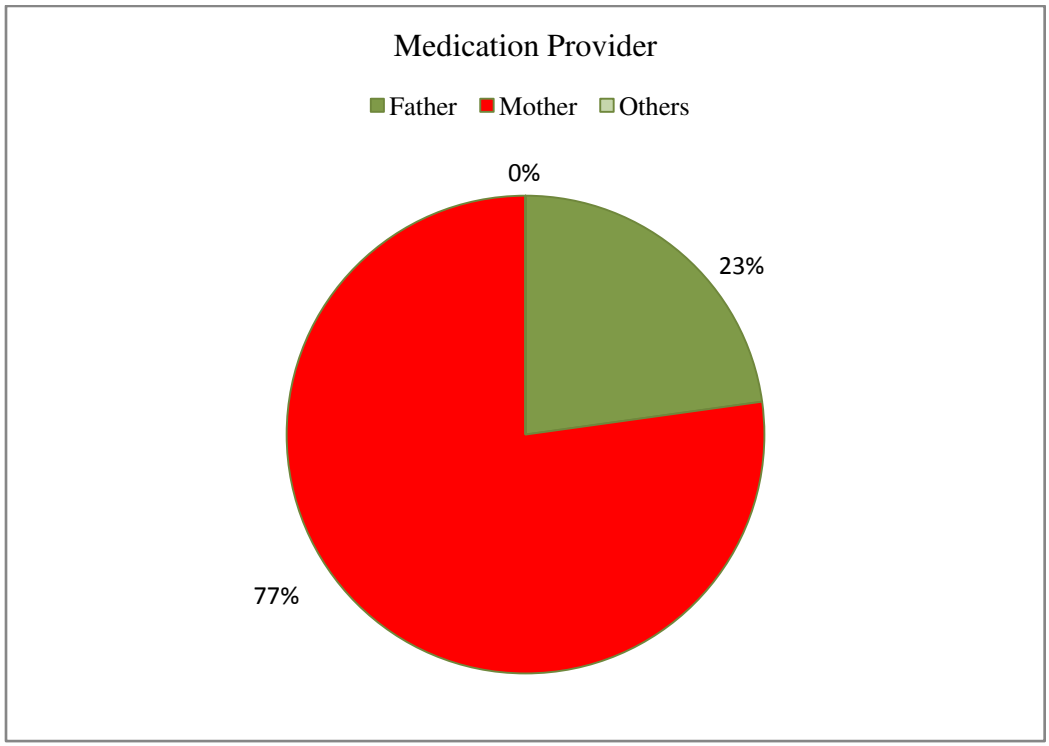

Figure 4.1.1: Parent filling up the questionnaire. From this column chart we found that, the majority of the respondents are mother (77%)

4.1.2 Education level of parent filling up the questionnaire

Table 4.1.2: Education level of parent filling up the questionnaire

Educational level	Number	Percent
Primary school	52	10.00%
School certificate (Class 10 Equivalent)	224	44.80%
High school (Class 12 equivalent)	150	30.00%
Non-university Diploma	3	0.60%
Bachelors	32	6.40%
Post-graduate	39	7.80%
Total=500		

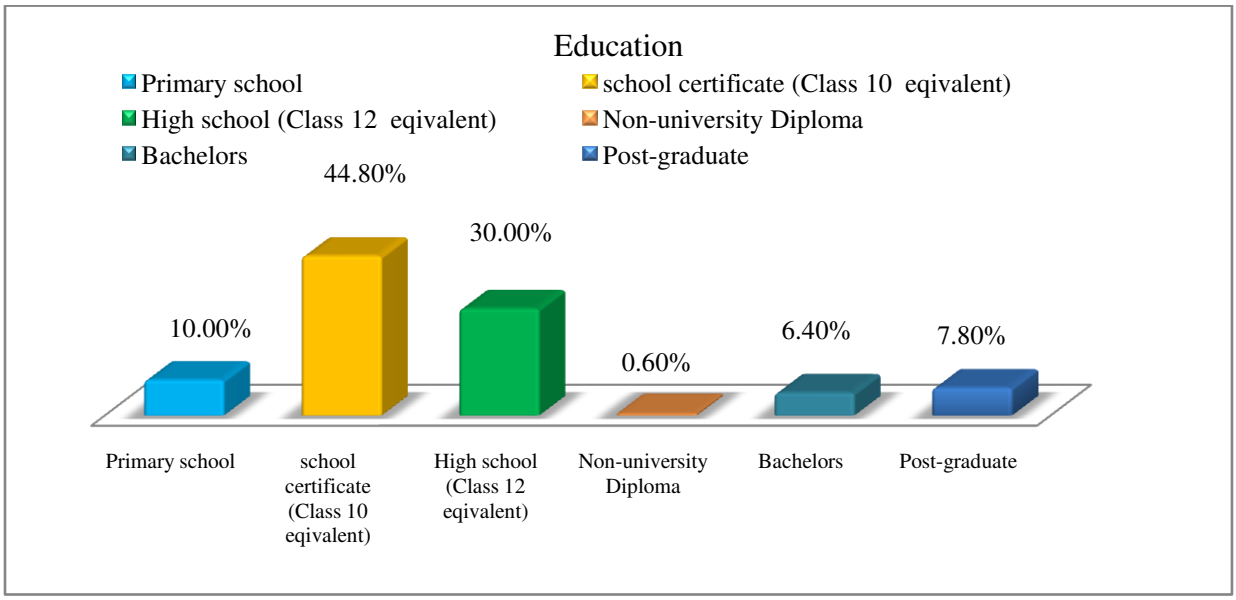

Figure 4.1.2: Education Level of parent filling up the questionnaire

From this column chart we see that, maximum medication provider have education level school certificate (44.40%), high school certificate (class 12 equivalent) (30.00%), Primary school (10%).

4.1.3 Occupation of parent filling up the questionnaire

Table 4.1.3 Occupation of parent filling up the questionnaire

Occupation	Number	Percent
Studying	8	1.60%
Homemaker	372	74.40%
Healthcare professional	15	3%
Unemployed	6	1.20%
Others	99	19.80%
Total=500		

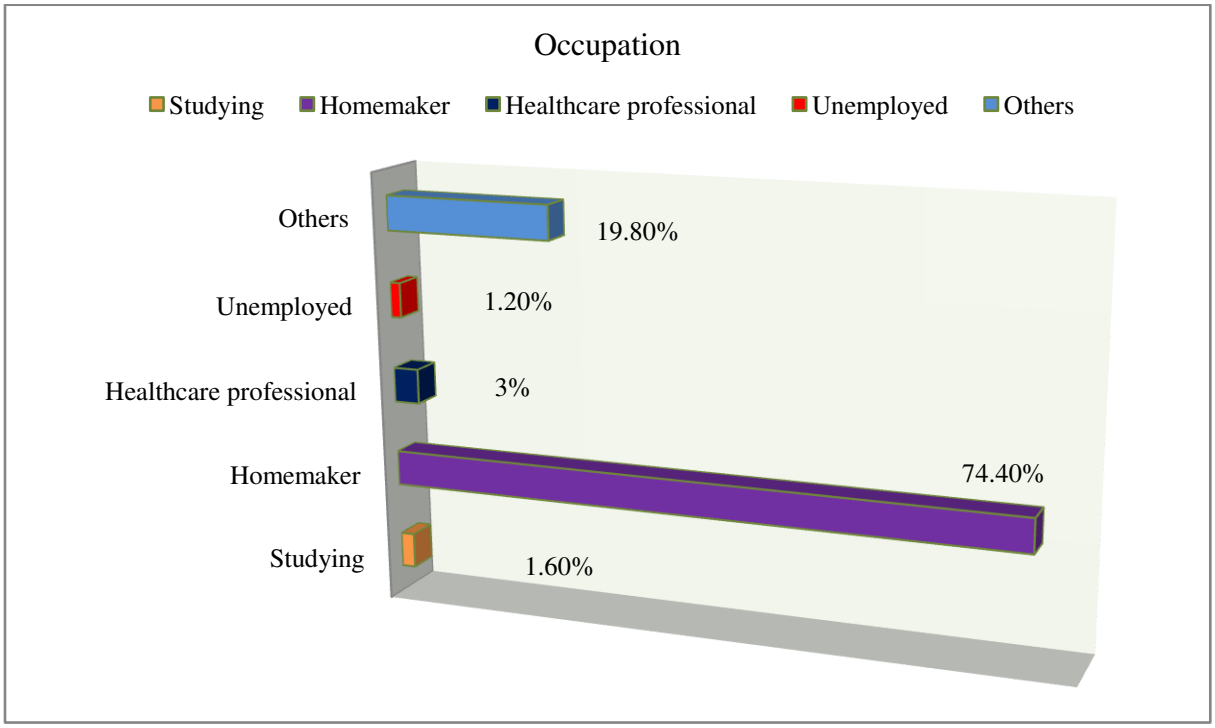

Figure 4.1.3: Occupation of Parent filling up the questionnaire

From this figure we found that majority of the respondents are homemaker (74.40%).

4.1.4 Net household income (in BDT) of parent filling up the questionnaire

Table 4.1.4: Net household income (in BDT) of parent filling up the questionnaire

Net Household income	Number	Percent
<Tk 5000	0	0%
Tk 5000-10000	55	11%
Tk 10000-30000	280	56%
Tk 30000<	165	33%
Total=500		

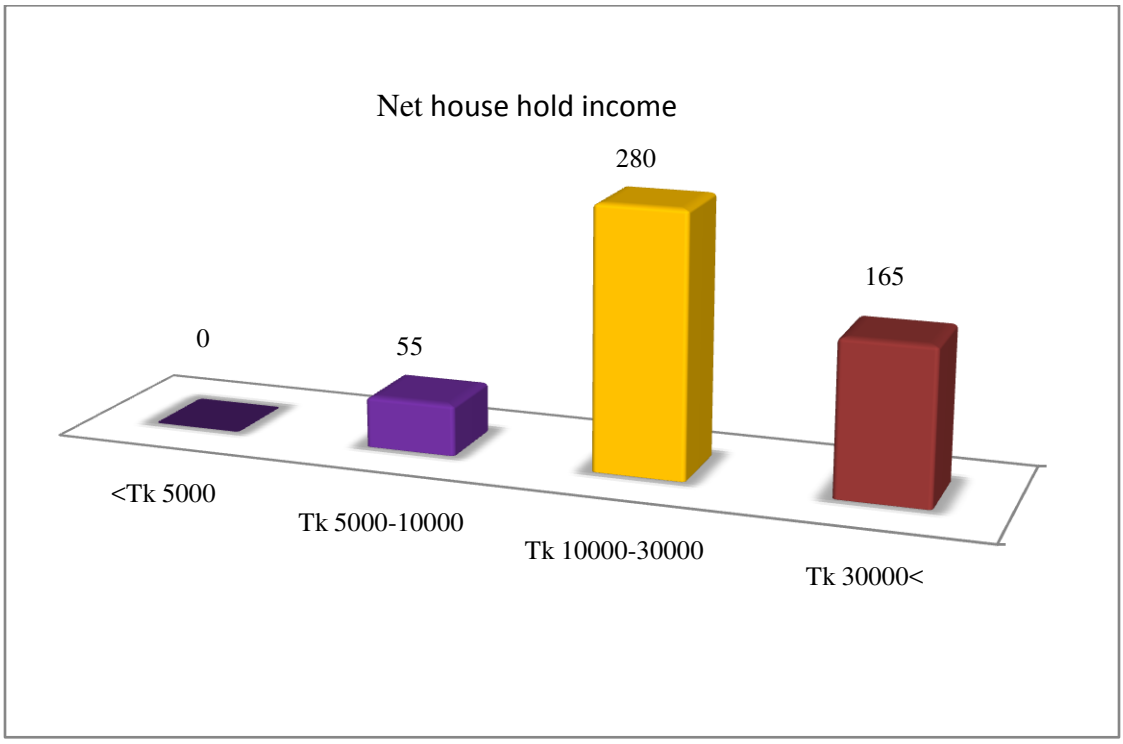

Figure 4.1.4: Net household income (in BDT) of Parent filling up the questionnaire

Among the total respondents, majority respondent's family net household income is in the range of Tk (10000-30000).

4.1.5 Number of child in the family

Table4.1.5: Number of child in the family

Number of Children	Frequency	Percent
1	165	33%
2	305	61%
3	30	6%
Others	0	0%
Total=500		

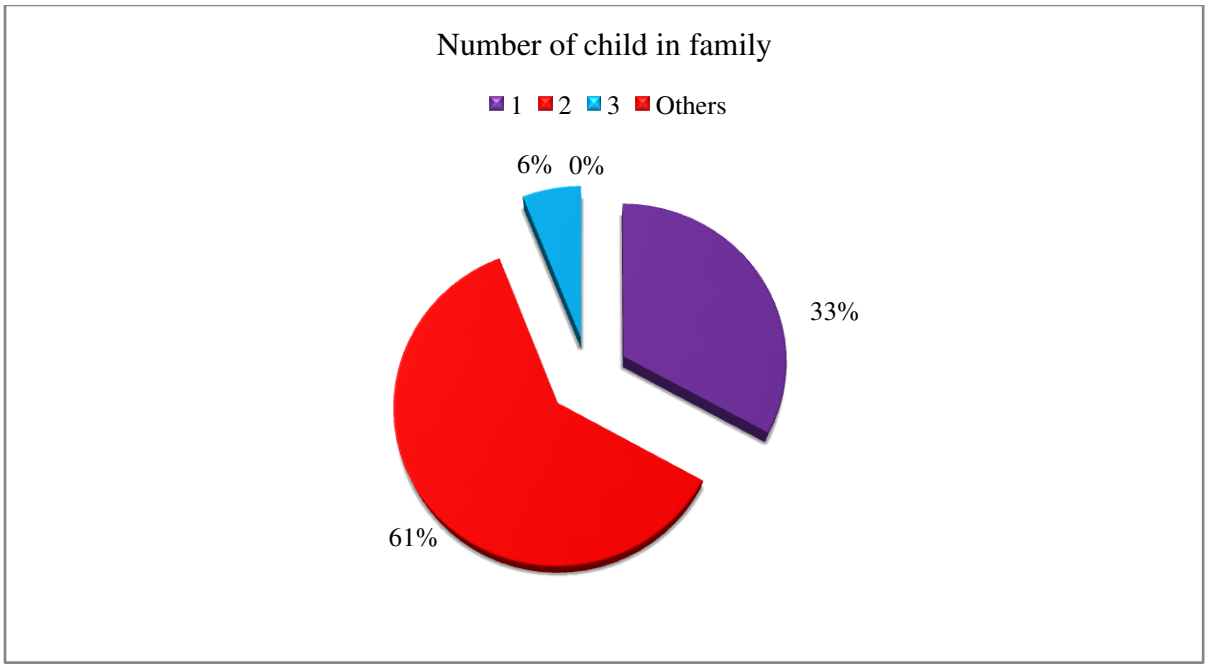

Figure 4.1.5: Number of child in the family of responders

Among of those respondents, most of the family has two children (61%). 33% family has one child and 6% family has three child.

4.1.6 Healthcare degree of the parent filling up the questionnaire

Table 4.1.6: Healthcare degree of the parent filling up the questionnaire

Healthcare degree	Yes	No
percent	13%	87%
Number	65	435

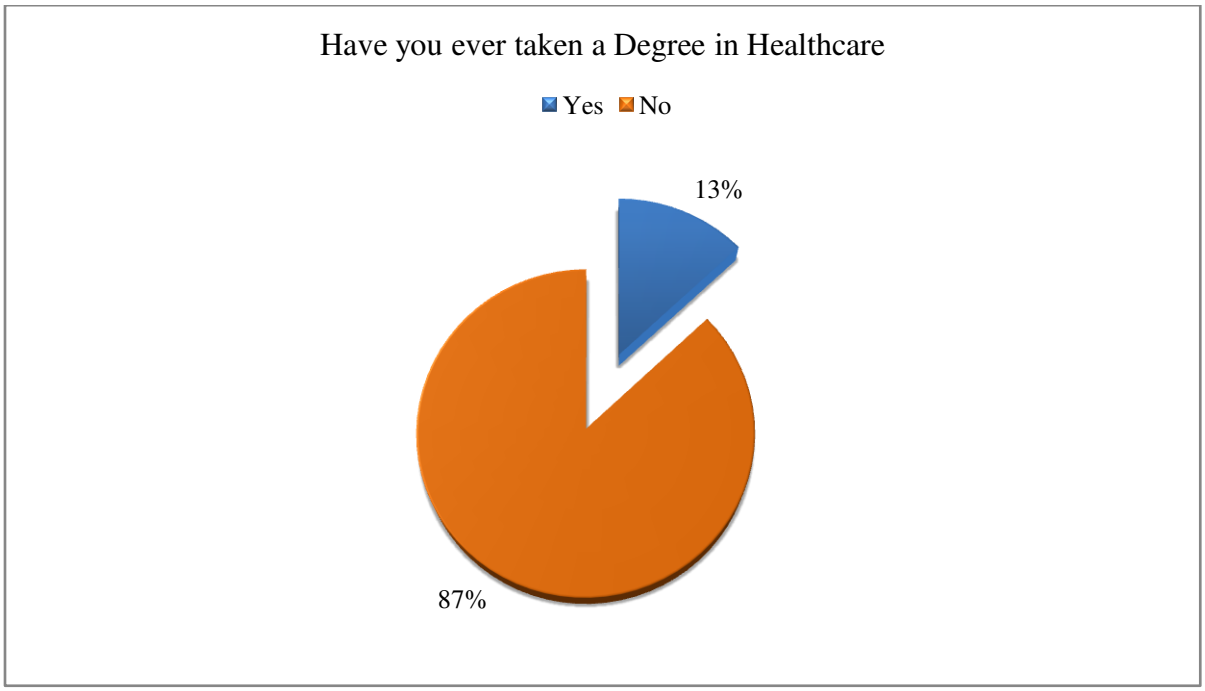

Figure 4.1.6: Health care degree

Among all of those respondents, majority of the respondents (87%) do not have any health care degree. Only 13%% respondents have health care degree.

4.1.7 Age of child (who is medicated)

Table 4.1.7: Age of child (who is medicated)

Age of children	Number	Percent
< 3 months	83	16.60%
3 months-1 year	278	55.60%
1year- 5 years	99	19.80%
5 years- 12 years	40	8.00%
Total=500		

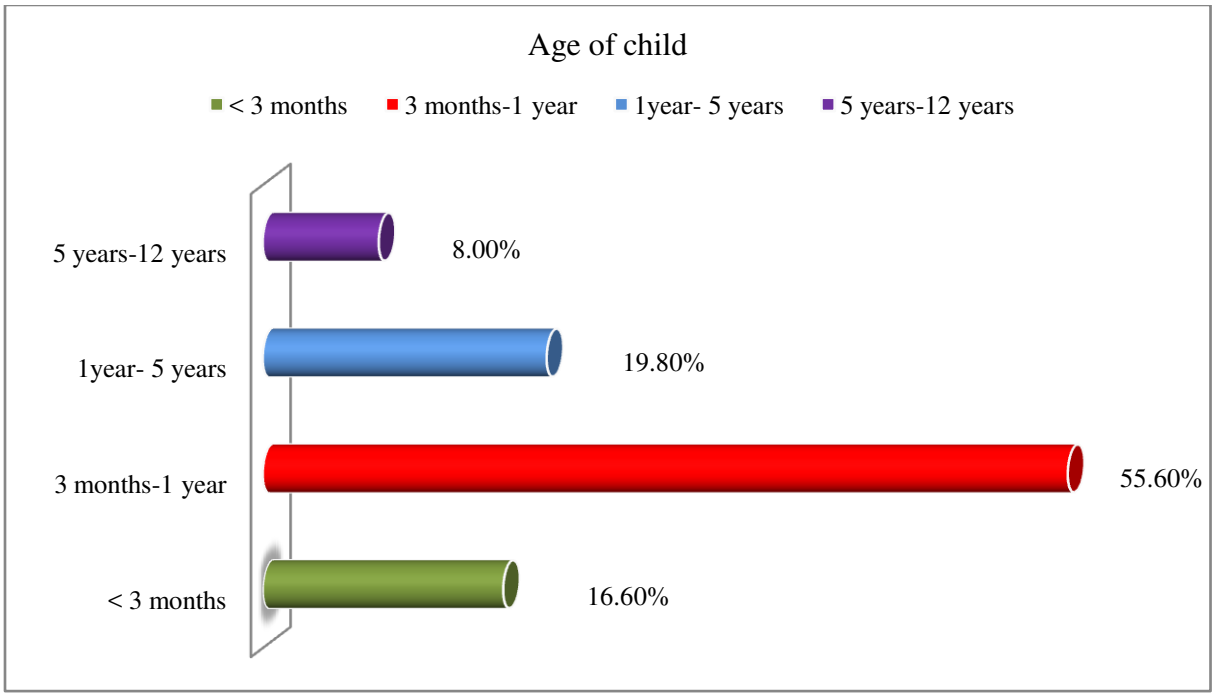

Figure 4.1.7: Age of child (who is medicated)

The above graph shows that children of 3 months to 1 year old required greater (55.60%) percent of medication.

4.1.8 Gender of child

Table 4.1.8: Gender of child

Gender of Child	Number	Percentage
Male	278	55.60%
Female	222	44.40%
Total=500		

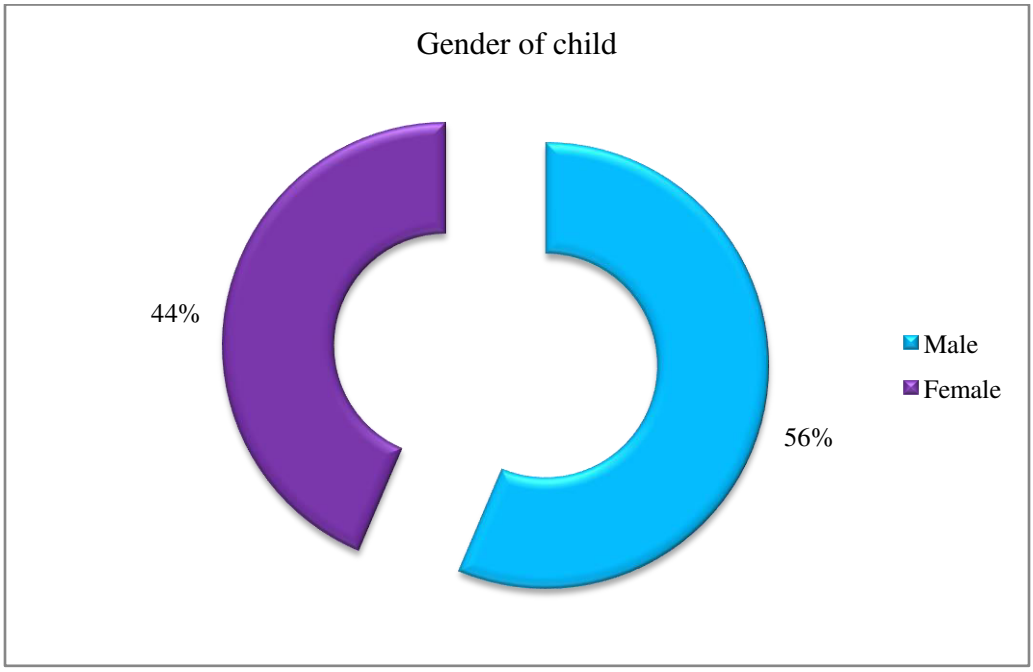

Figure 4.1.8: Gender of child

There is high percentages of male children are medicated by their parents then the female children.

4.1.9 Child who is medicated

Table 4.1.9: Child who is medicated

Who is medicated	Number	Percent
1st born	221	44.20%
2nd born	261	52.20%
3rd born	18	3.60%
	Total=500	

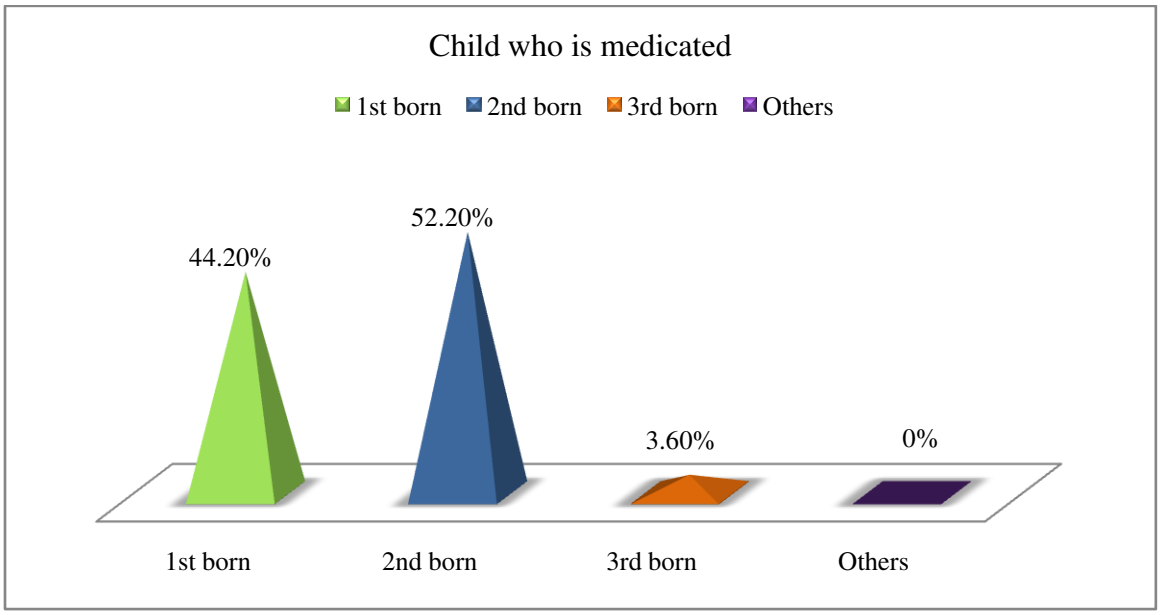

Figure 4.1.9: Child who is medicated

Among all respondents, most of the children were either 1st or 2nd born who is medicated.

4.2 Child's disease during and medication usage information

4.2.1 Nature of diseases

Table 4.2.1: Nature of diseases

Name of disease	Number
Nasal congestion	1
Nasal congestion	3
Cough and cold	172
Sore throat	5
Fever	144
Diarrhea	111
Skin wound or infection	51
Pain and burning during urination	10
Dental or gingival complication	2
Abnormal discharge and vaginal infection	0
Pain and redness of tonsils	1
Others	0
Total=500	

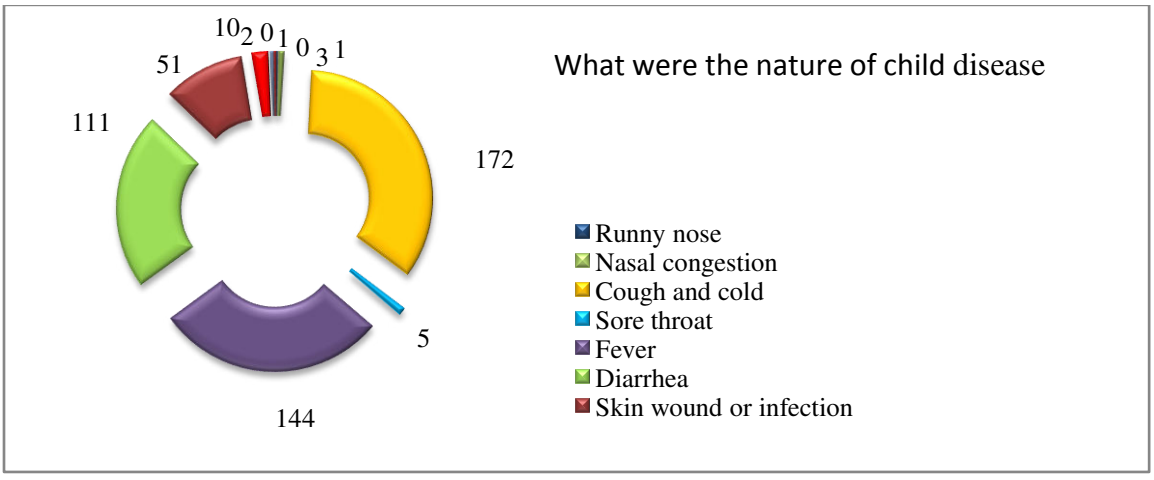

Figure 4.2.1: Nature of diseases

Form survey it has seen that majority of the children (34.4%) have suffered from cough and cold.

4.2.2 Perception of parents about health status of child

Table 4.2.2: Perception of parents about health status of child

Health status	Number of population	Percent
Good	26	5.20%
Fairly good	84	17%
Moderate	101	20.20%
Fairly poor	41	8.20%
Poor	248	49.60%
Total=500		

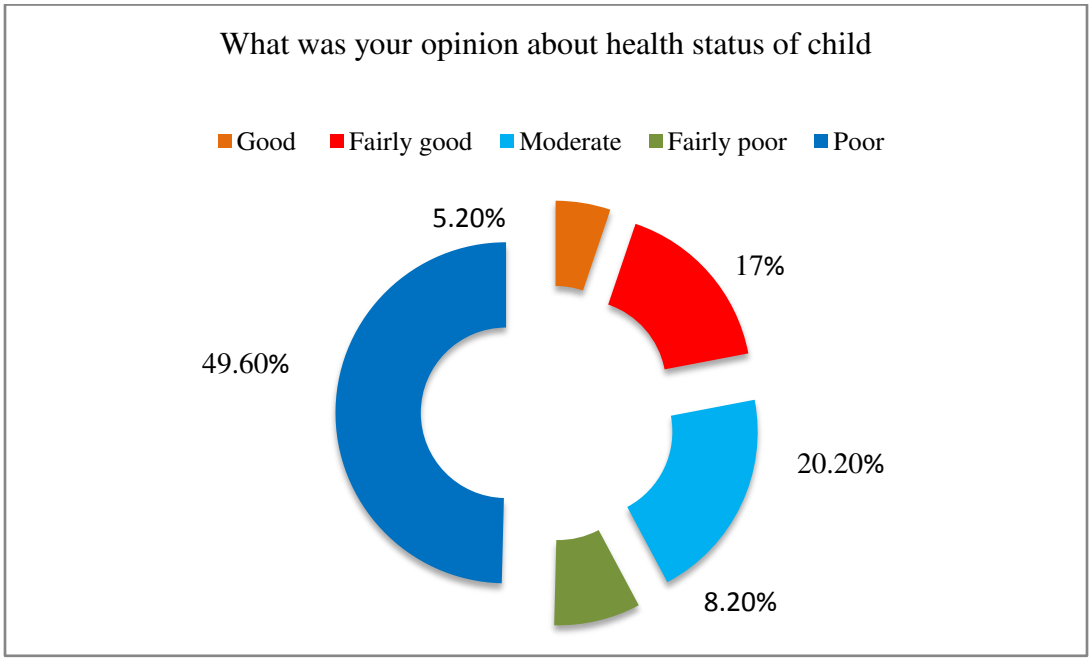

Figure 4.2.2: Perception of parents about health status of child

Form this study it has seen that all the children suffered from various diseases during last 6 month but almost 49.80% parents thought their child's health status is poor enough and 20.20% parent thought their children's health status is moderate.

4.3 Parental perception and understanding of antibiotic use

4.3.1 Response of parents when child suffered from disease

Table 4.3.1: Response of parents when child suffered from disease

How did you respond	Population number	Percentage
Consulted a doctor	405	81.00%
Consulted a non-prescribing health care professional	0	0%
Waited until the disease relieved	0	0%
Waited until the disease relieved	0	0%
Self-medicated	95	19.00%

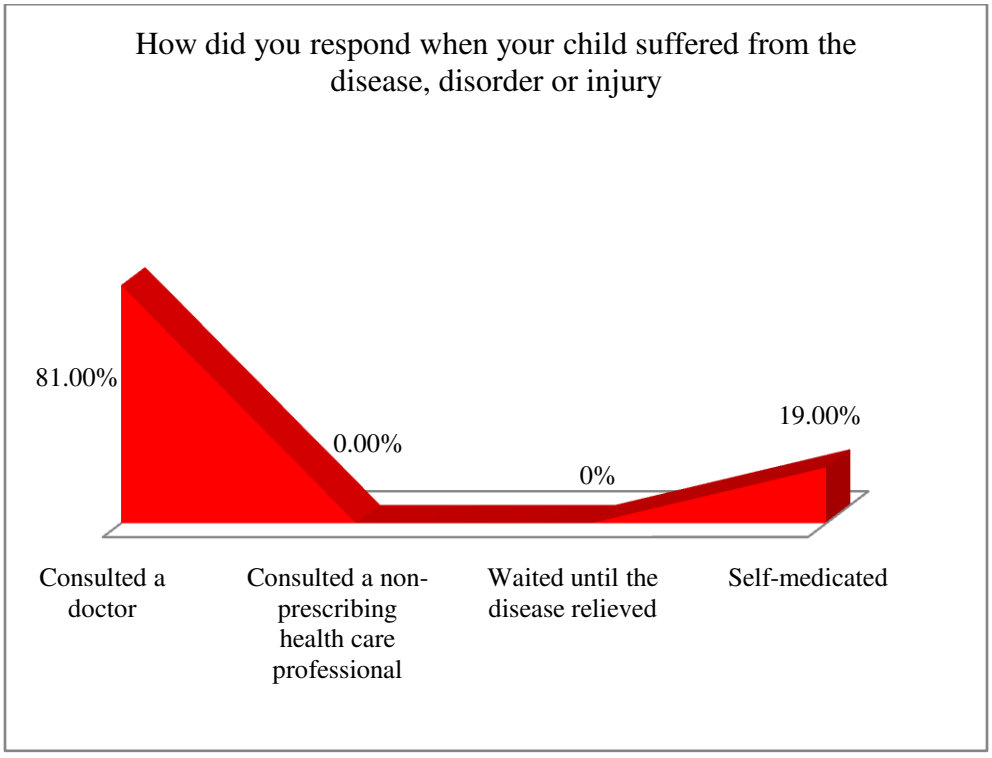

Figure 4.3.1: Response of parents when child suffered from disease

From this survey it is found that 19.00% respondents have self-medicated their child when their child suffered from disease, 81.00% have consulted a doctor and maintain prescription.

4.3.2 Perception of safety of self-medication

Teble4.3.2: Perception of safety of self-medication

Is self medication of child is safer?	Number	Percent
Yes	3	3.15%
No	92	96.84%
Total=95		

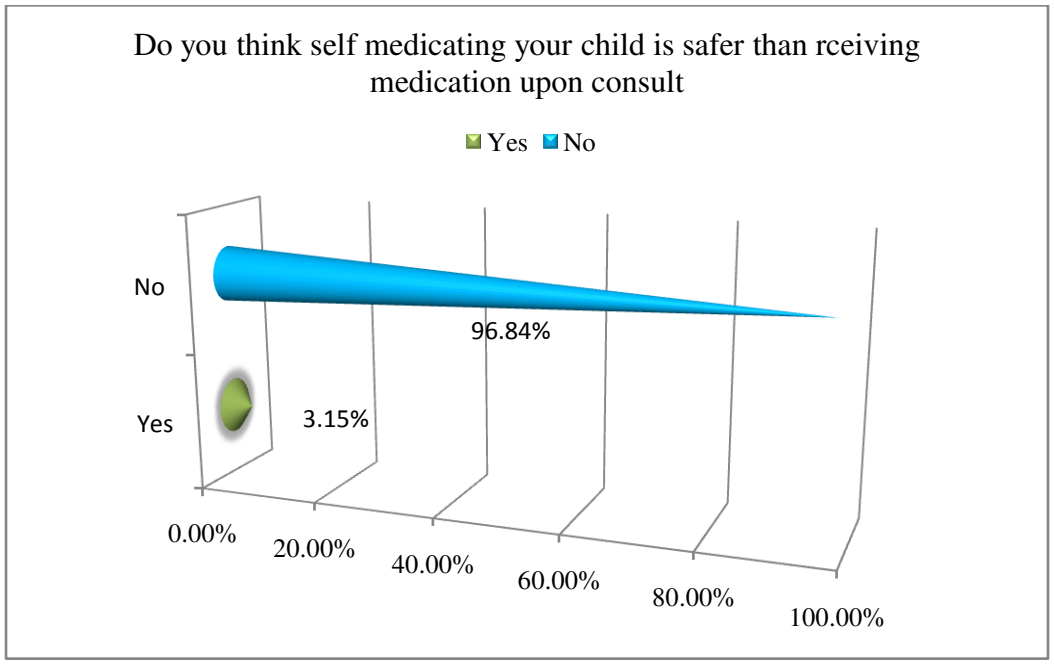

Figure 4.3.2: Perception of safety of self-medication

Maximum of the respondents said that, self-medication is not safer than the doctor consultation.

4.3.3 Reasons behind self-medication

Table 4.3.3: Reasons behind self-medication

Reasons behind self medication	Number	Percent
Considered ailment as minor	1	1.05%
Self decision by parents	10	10.52%
Previous treatment by physician was unsuccessful	2	2.10%
Long waiting time to avil doctor	8	8.24%
Asked doctor for a medication	2	2%
Shortage of drug supply in stores	0	0%
Previous prescription as reference for same illness	60	63.15%
High cost of treatment	4	4.20%
Taking child in inconvenient	0	0%
Lack of nearby health care provider	8	8.42%
Problems with behavior of medical staff	0	0%
Others	0	0%
Total self-medicated number= 95		

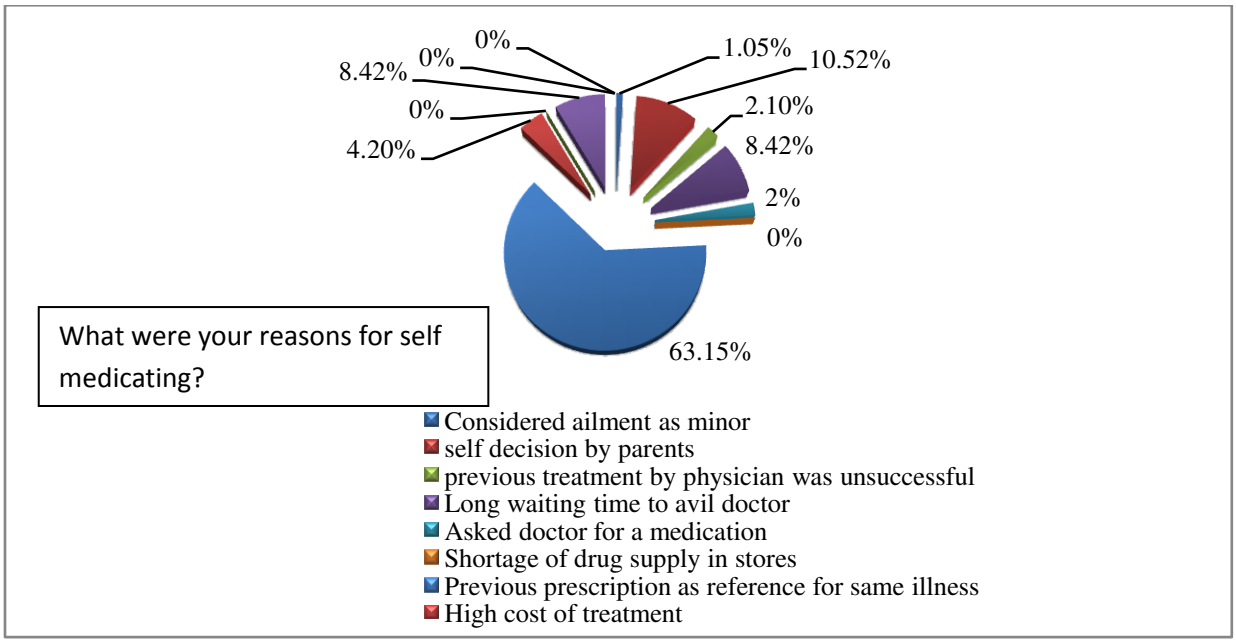

Figure 4.3.3: Reasons behind self-medication

63.15% respondent's previous prescription as reference for same illness, 10.52% respondents said that self-medication decision by parents.

4.3.4 Antibiotics which are self-medicated

Table 4.3.4: Antibiotics which are self-medicated

Name of Antibiotics	Number	Percent
Amoxicillin	1	10.05%
Azithromycine	29	30.52%
Cefixime	29	30.52%
Cefuroxima	2	2.10%
Ciprofloxacin	12	12.62%
Cotrimazole	4	4.21%
Metronidazole	18	14.94%
Total=95		

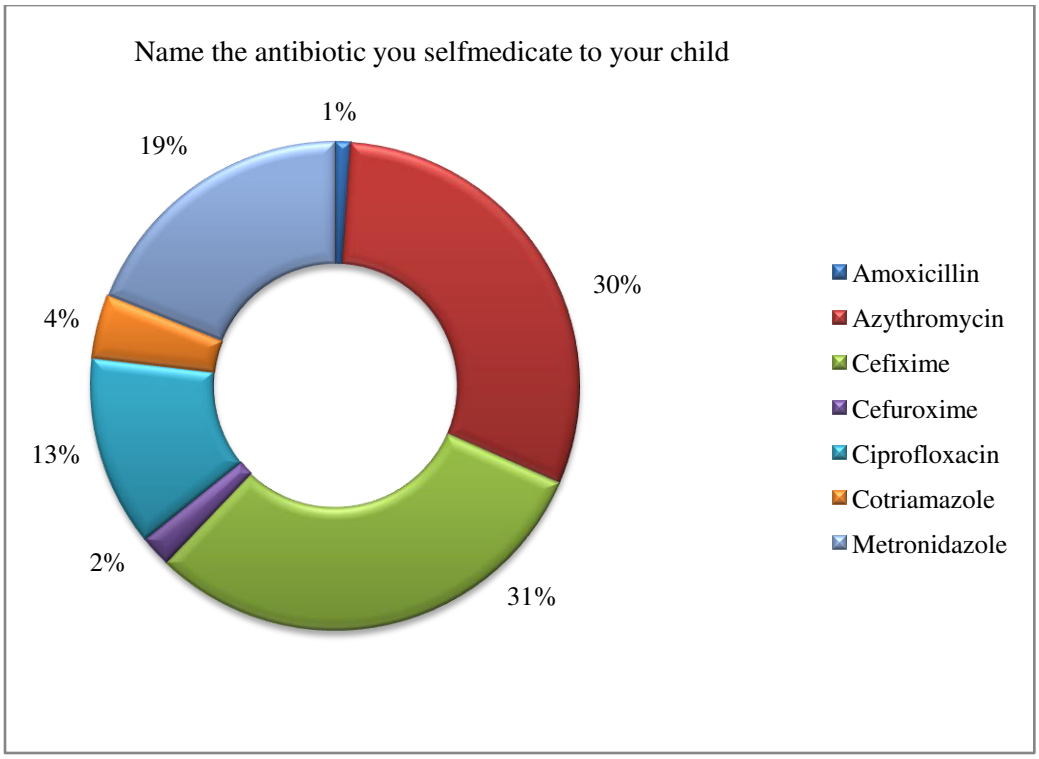

Figure 4.3.4: Medication history

Majority of respond to the self medicated antibiotic is azithromycine (30%), cefixime (31%), and ciprofloxacin (13%)

4.3.5 Conscious about side effect of the antibiotic prior to administration in child

Table 4.3.5: Conscious about side effect of the antibiotic prior to administration in child

Conscious about side effect	Number	Percent
Yes	32	33.68%
No	63	66.31%
Total=95		

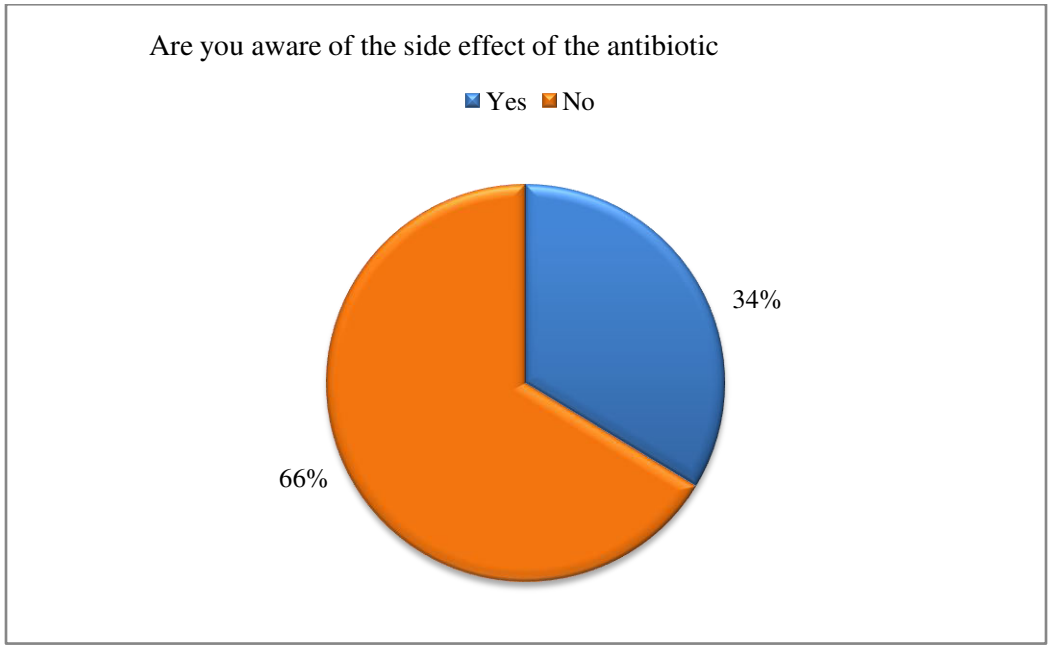

Figure 4.3.5: Conscious about side effect of the antibiotics

Among all the respondents, 66% respondents are not conscious about the side effect of the drug and 34% respondents said that they are conscious about the side effect of the drug.

4.3.6 Knowledge about antibiotic before administering that to child

4.3.6: Knowledge about antibiotic before administering that to child

Knowledge about drug before administering	Number	Percent
Yes	27	24.42%
No	68	71.57%
Total=95		

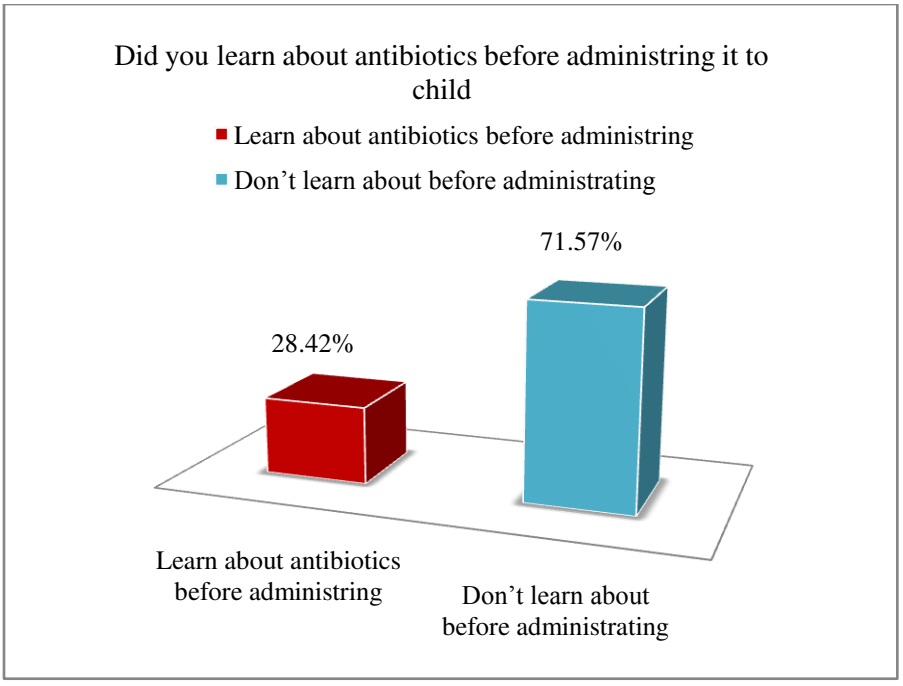

Figure 4.3.6: Knowledge about antibiotics administration

Majority of the respondents (71.57%) have no knowledge about drug administration and only 28.42% respondents have the knowledge about the drug before administering that drug to their child.

4.3.7 Source of Information regarding the antibiotic

Table4.3.7: Source of Information regarding the antibiotic

Source of Information	Response number	Percentage
Health care professionals	74	78%
Drug sellers	1	1%
Family and friends	14	14.73%
Media	1	1.05%
Patient information leaflet	5	5%
Others	0	0%
Total=95		

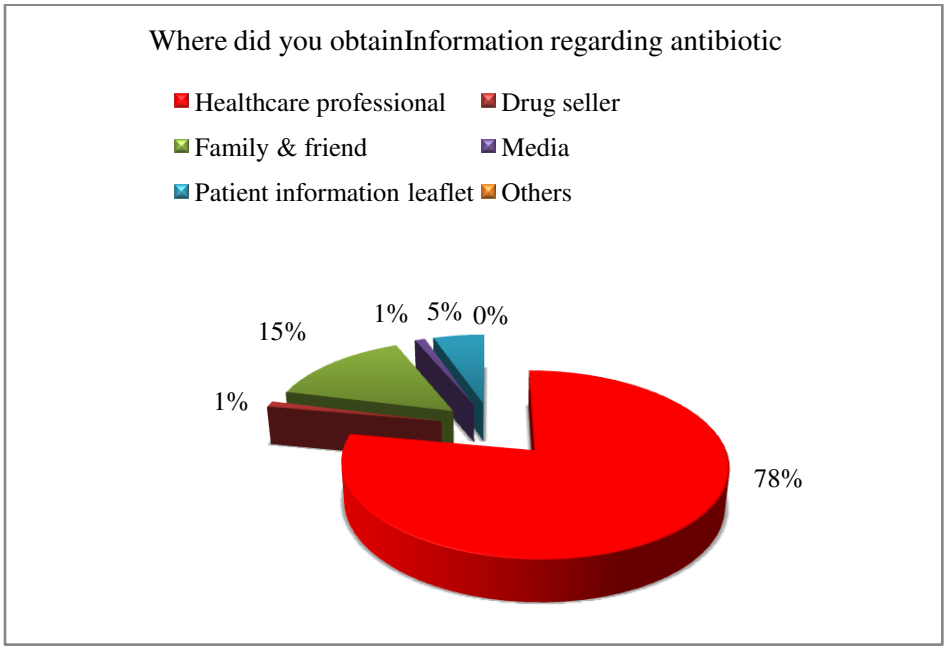

Figure 4.3.7: Source of Information regarding the antibiotics

Majority 78% respondents gathered knowledge about drug from healthcare professionals.

4.3.8 Source of medication

Table 4.3.8: Source of medication

Source of medication	Number	Percentage
OTC from dispensaries	67	70.52%
Healthcare professionals	22	23.15%
Friends and family	0	0%
Family medicine cabinet	1	1.05%
Others	5	5%
Total=95		

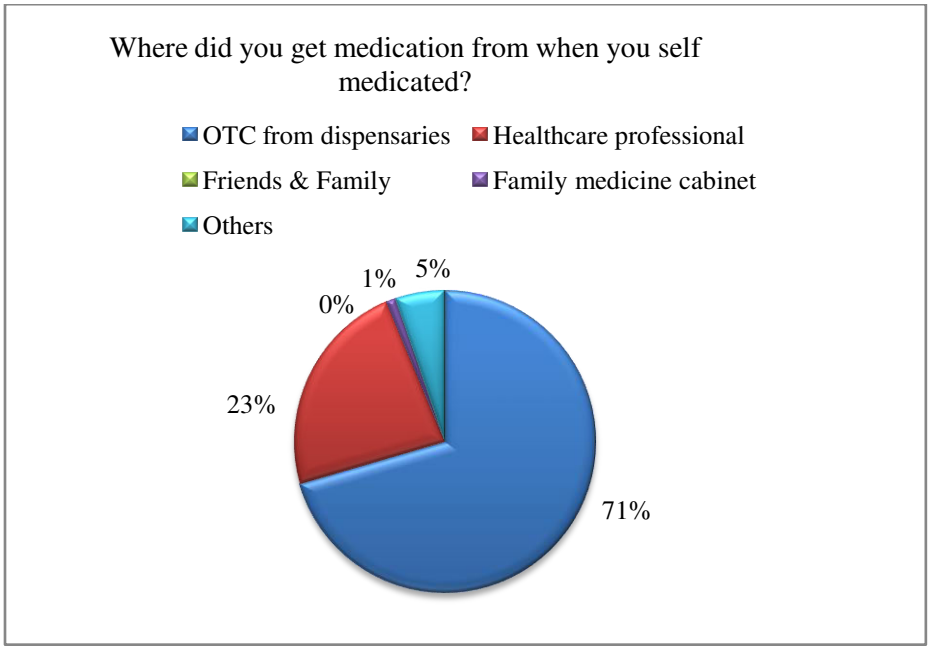

Figure 4.3.8: Source of medication

Main sources of medicine were personnel at OTC from dispensaries (71%).

4.3.9 Name of the prescribed antibiotic

Table 4.3.9: Name of the prescribed antibiotic

Name of prescribed antibiotics	Number	Percent
Amoxicillin	25	6.17%
Azithromycin	138	34.07%
Cefixime	80	19.75%
Cefuroxime	10	2.46%
Ciprofloxacin	86	21.23%
Erythromycine	18	4.44%
Norfloxacin	2	0.49%
Cotrimazole	9	2.22%
Metronidazole	37	9.13%
Total=405		

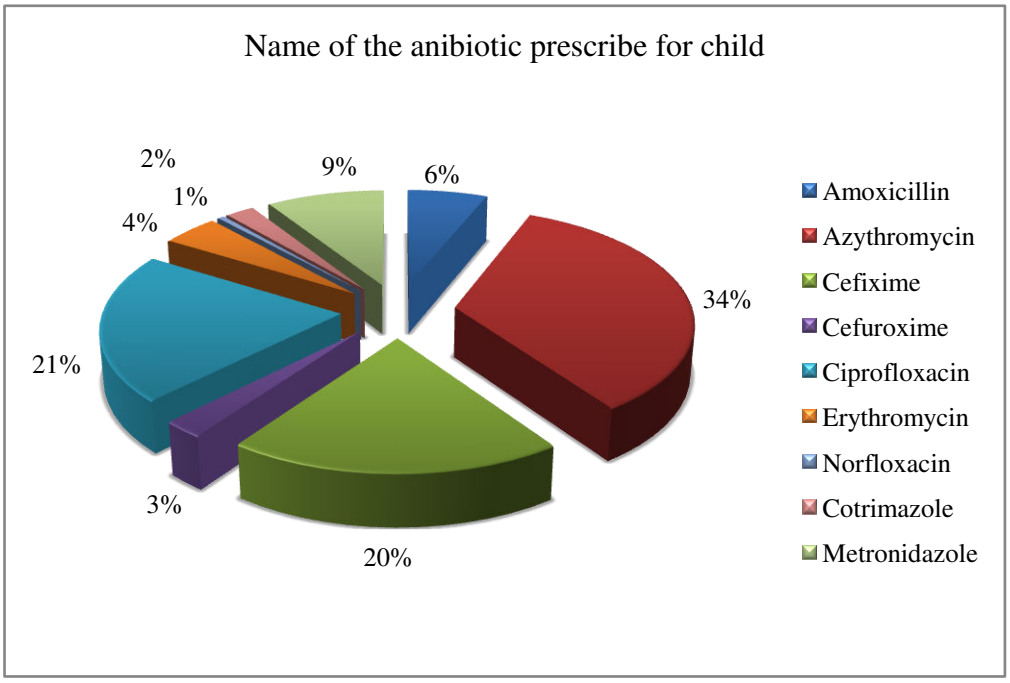

Figure 4.3.9: Name of the prescribed antibiotic.

The most prescribed antibiotics are cefixime (20%), ciprofloxacin (21%) & azithromycine (34%).

4.3.10 Agreement to treatment schedule provided by physician

Table 4.3.10: Agreement to treatment schedule provided by physician

Agreement to treatment schedule	Number	Percent
Yes	400	99%
No	5	1%
Total=405		

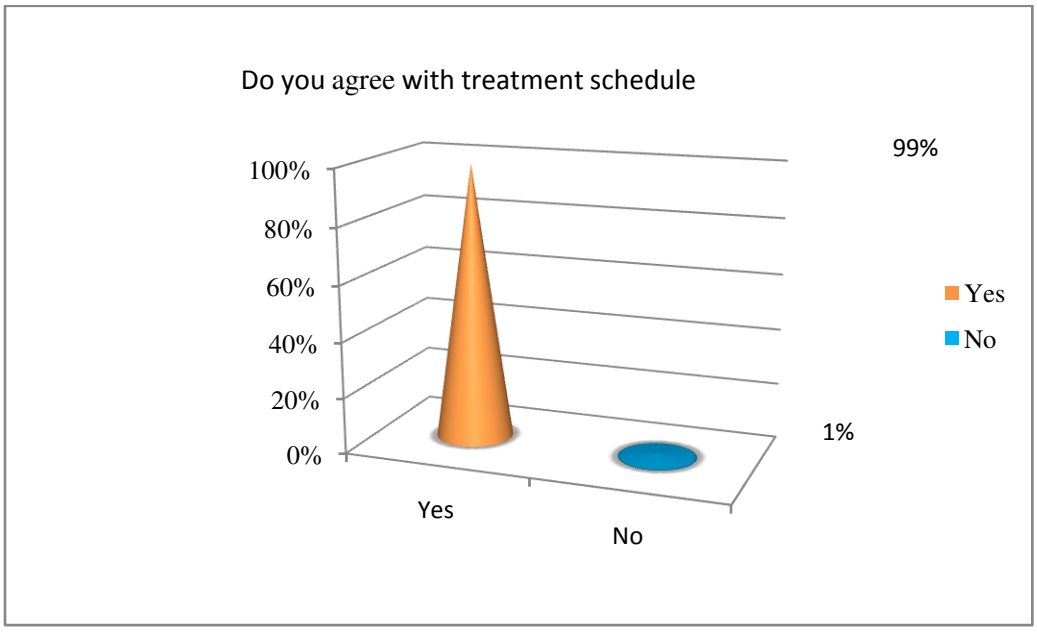

Figure 4.3.10: Agreement to treatment schedule provided by physician

Most of all respondent's doing agree to the treatment schedule provided by the doctors and only 99% is disagreed to the treatment schedule.

4.3.11 Request for antibiotic from physician

4.3.11: Request for antibiotic from physician

Request for antibiotic	Number	Percent
Yes	35	9%
No	370	91%
Total=405		

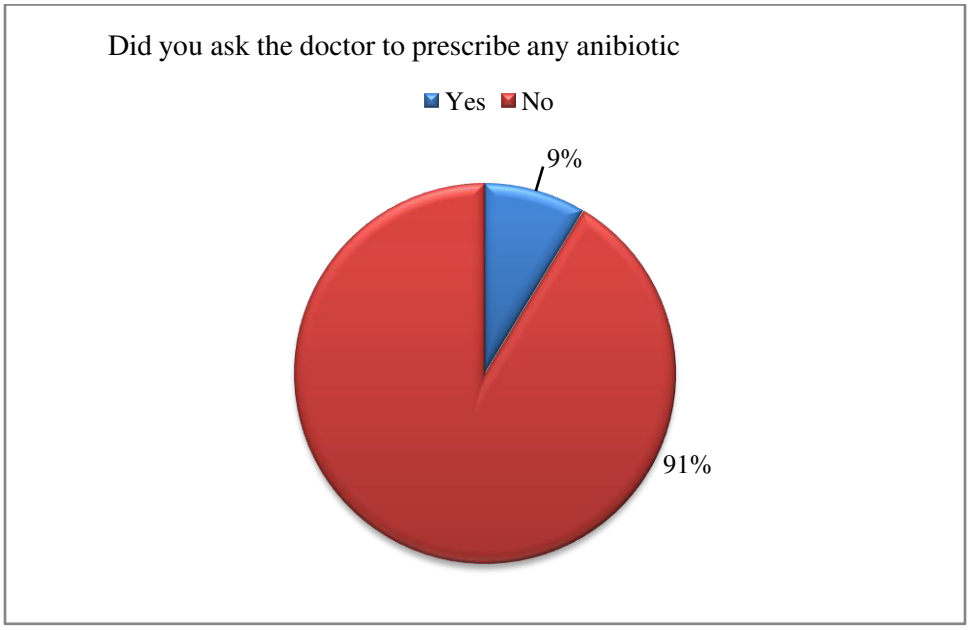

Figure 4.3.11: Request for antibiotic from physician

Major portion of respondents do not give suggestion to doctor about antibiotic for their child but only a few percent respondents are ask doctors to prescribed antibiotic.

4.3.12 Request for specific antibiotic from physician

Table 4.3.12: Request for specific antibiotic from physician

Request for specific antibiotic	Number	Percent
Yes	22	5%
No	383	95%
Total=405		

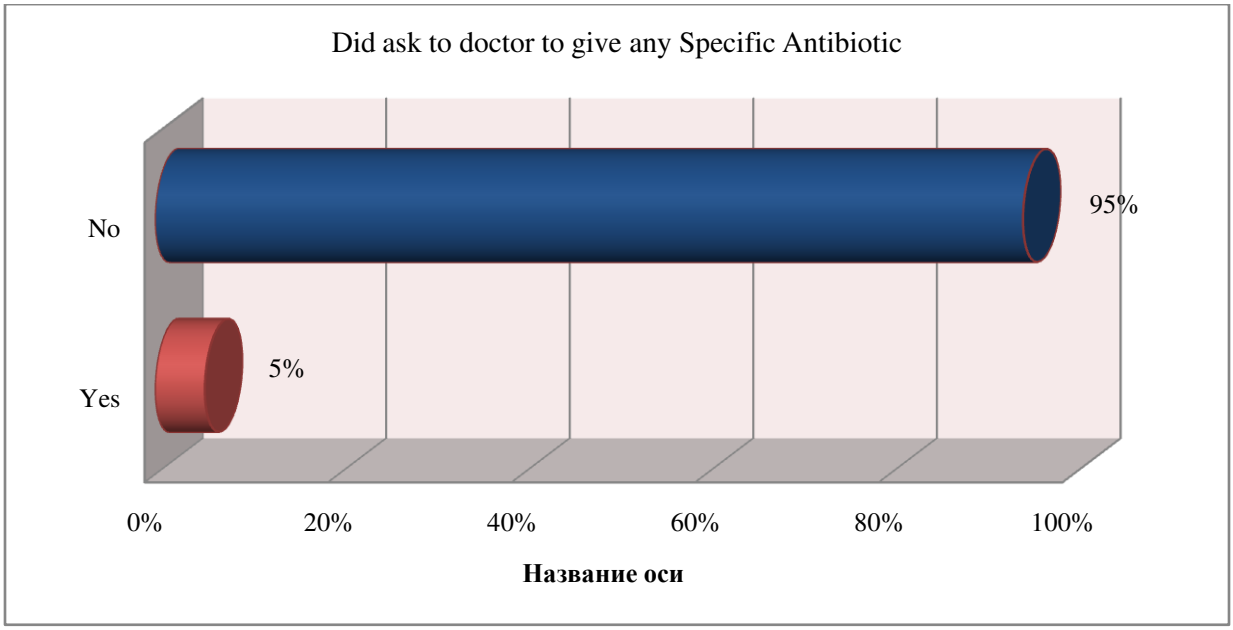

Figure 4.3.12: Request for specific antibiotic from physician

Major portion of respondents do not give suggestion to doctor about specific antibiotic for their child but only a few percent respondents are ask doctors to prescribe specific antibiotic.

4.3.13 Opinion of parents regarding tendency of prescribing antibiotic by doctor

Table 4.3.13 Opinion of parents regarding tendency of prescribing antibiotic by doctor

Opinion of patients	Number	Percent
Yes	19	3%
No	392	97%
Total=405		

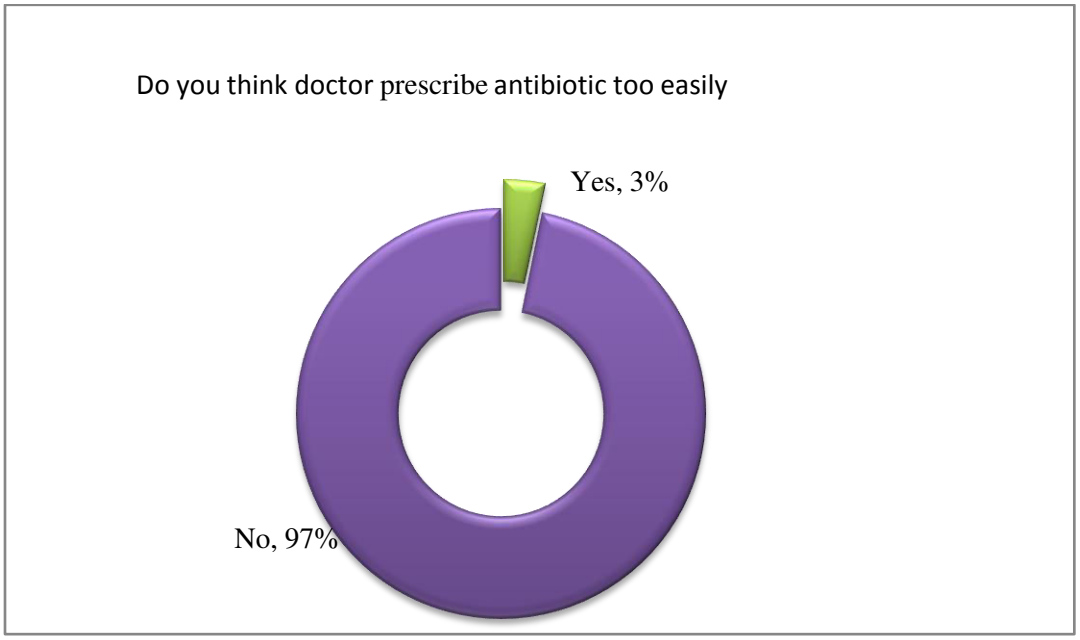

Figure 4.3.13: Tendency of prescribing antibiotic by physician

Maximum respondent thought and believed that doctors have low tendency of prescribing antibiotic but 97 % people do not think so.

4.3.14 Discontinuation of the antibiotic therapy

Table 4.3.14: Discontinuation of the antibiotic therapy

Discontinuation of the drug therapy	Number	Percent
Yes	7	2%
No	398	98%
Total=405		

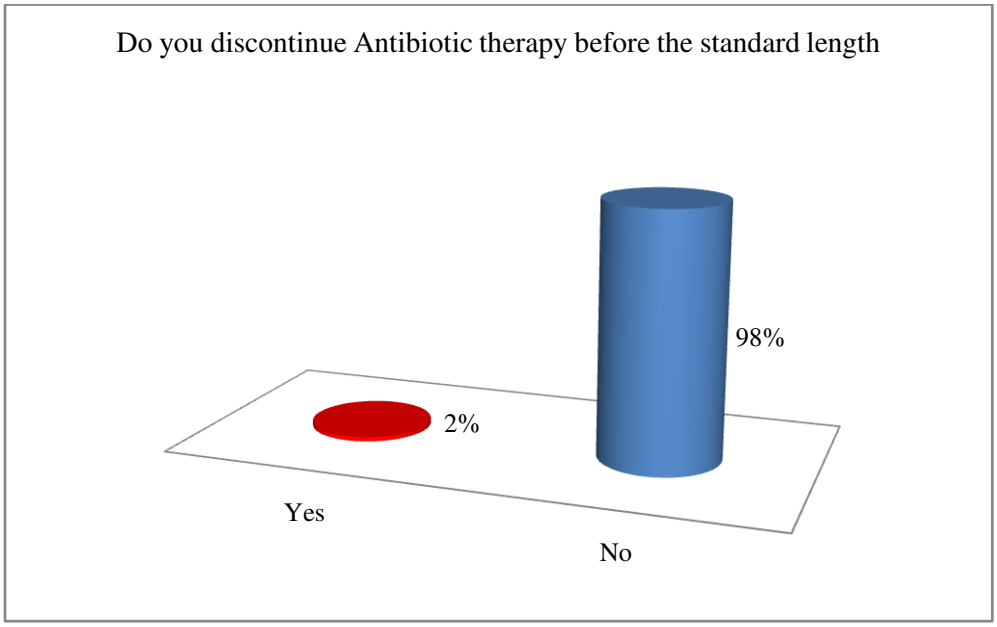

Figure 4.3.14: Discontinuation of the antibiotic therapy

All most half of the respondents did not discontinue the drug therapy whereas another half of the respondents discontinued the therapy.

4.3.15 Reasons behind discontinuation of the therapy

Table 4.3.15: Reasons behind discontinuation of the therapy

Reasons behind discontinuation	Number	Percent
Symptoms have disappeared	0	0%
Drugs ran out	0	0%
Side effects appeared	0	0%
Child was unwilling to take medication	0	0%
Others	5	1%
Total=5		

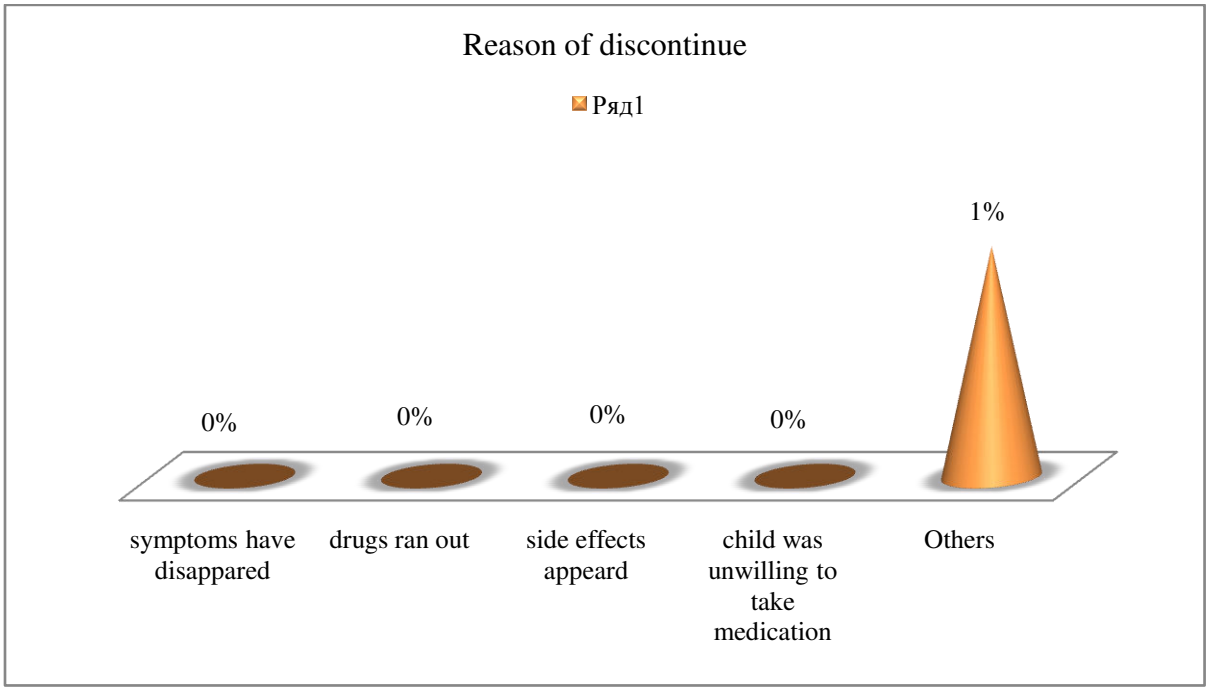

Figure 4.3.15: Reasons behind discontinuation of the therapy

Of the 96 number of respondents who discontinued antibiotic therapy, 90% of respondents stated

their reasons for discontinuation is disappearance of symptoms.

4.3.16 Suffering from side effect due to antibiotic use

Table 4.3.16: Suffering from side effect due to antibiotic use

Side effect appeared	Number	Percent
Yes	4	1%
No	401	99%
Total=405		

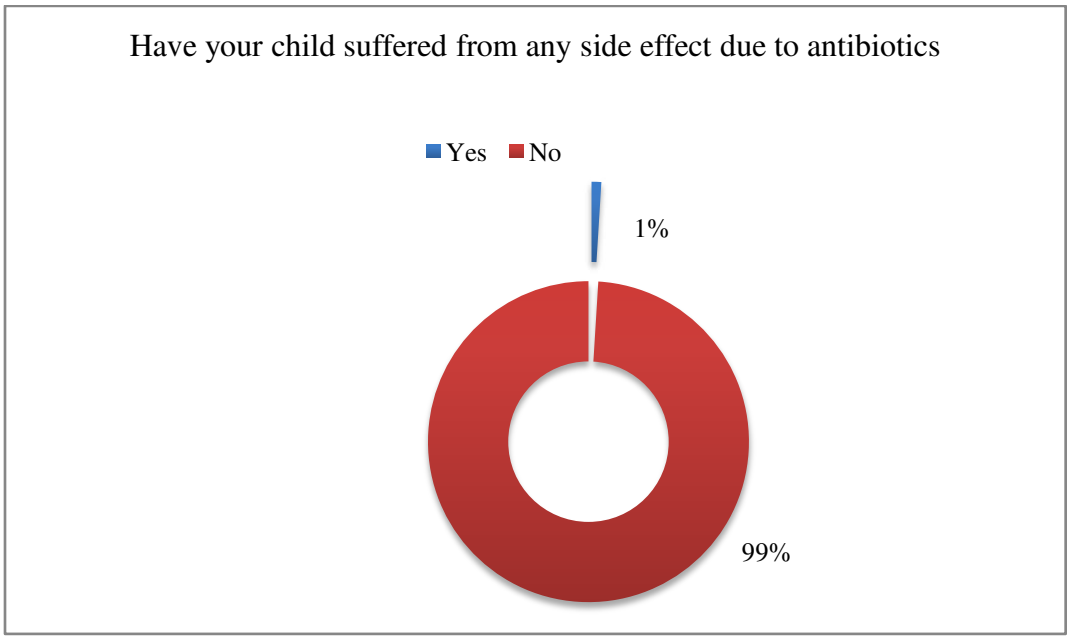

Figure 4.3.16: Suffering from side effect due to antibiotic use

Only 1% are suffered from side effect due to use of antibiotic both prescribed and self medicated medicines.

4.3.17 Remember the nature of the side-effect due to antibiotic use

Table 4.3.17: Remember the nature of the side-effect due to antibiotic use

Name of side-effect	Number	Percent
Constipation	2	o.49% or 0%
Rashes	1	0.24%
Vomiting	1	0.24%
Total=4		

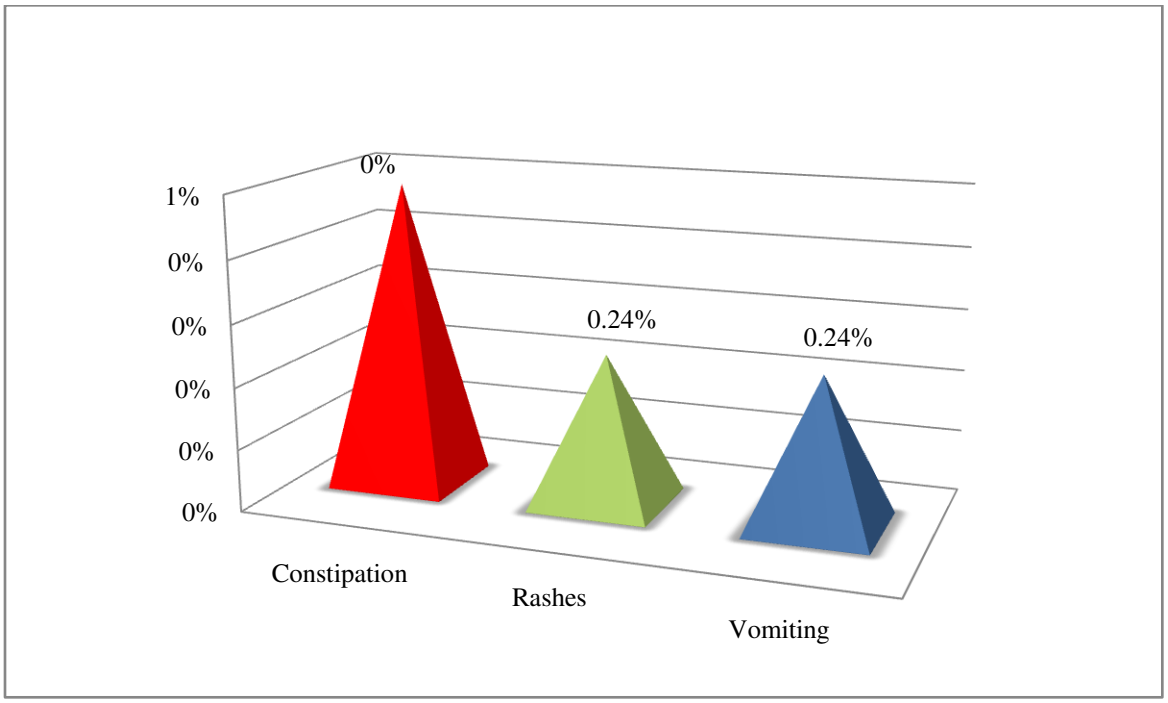

Figure 4.3.17: Remember the nature of the side-effect due to antibiotic use

Maximum people do not remember but some people say about constipation, rashes and vomiting as side effect of antibiotics.

4.4 Status of parental understanding of antibiotic use and resistance

4.4.1 Knowledge about antibiotic resistance

Table 4.4.1 Knowledge about antibiotic resistance

Knowledge about antibiotic resistance	Number	Percent
Agree	114	23%
Disagree	1	0%
Neither agree or disagree	7	1%
Do not know	378	76%
Total=500		

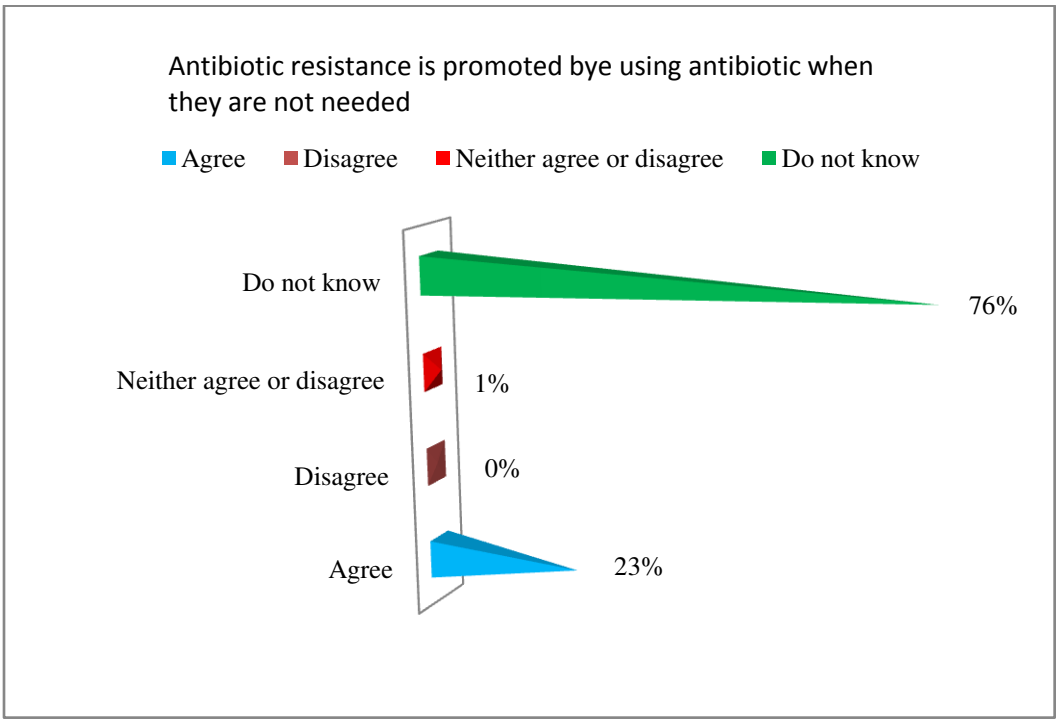

Figure 4.4.1: Knowledge about antibiotic resistance

Maximum portion of the respondents (76%) said that they do not have any idea on antibiotic resistance.

4.4.2 Antibiotic resistance is promoted by not completing full course of antibiotics

Table 4.4.2 Antibiotic resistance is promoted by not completing full course of antibiotics

Antibiotic resistance is promoted by not completing full course	Number	Percent
Agree	100	20%
Disagree	2	0.40%
Neither agree or disagree	11	2%
Do not know	**387**	77%
Total=500		

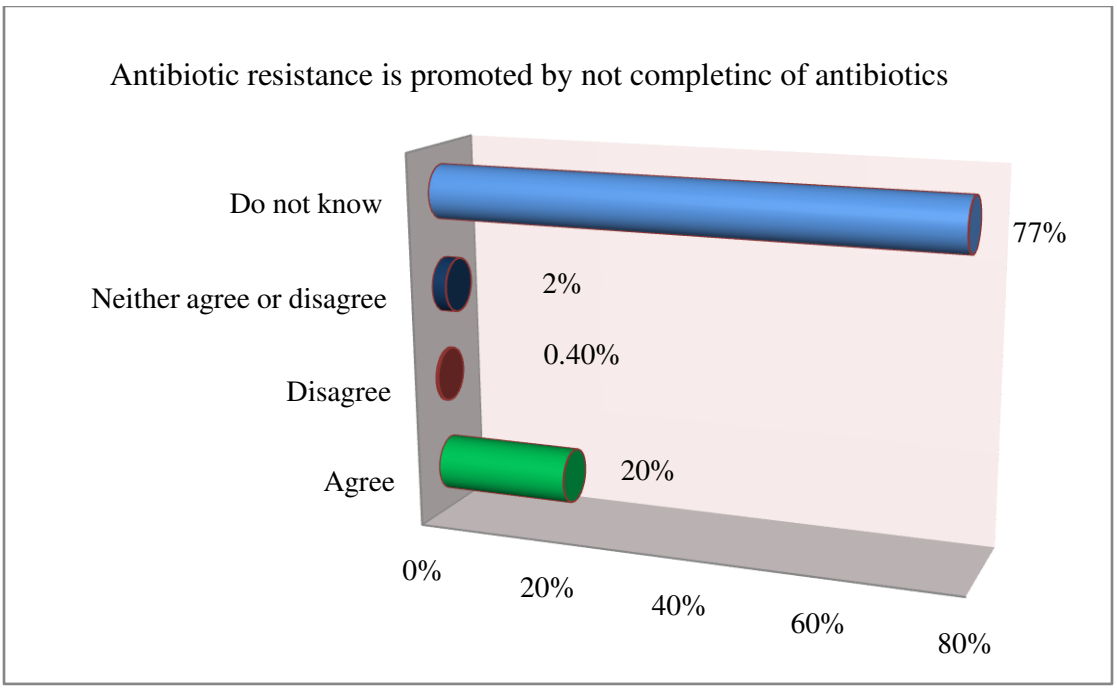

Figure 4.4.2: Antibiotic resistance is promoted by not completing full course of antibiotics

Maximum portion (77%) of the respondents said that they do not know whether antibiotic resistance builds up or not in case where the full course of antibiotic is not completed.

4.4.3 Antibiotic resistance due to self-medication of antibiotics

Table 4.4.3 Antibiotic resistance due to self-medication of antibiotics

Antibiotic resistance due to self-medication	Number	Percent
Agree	63	12.60%
Disagree	4	1%
Neither agree or disagree	14	2%
Do not know	419	84%
Total=500		

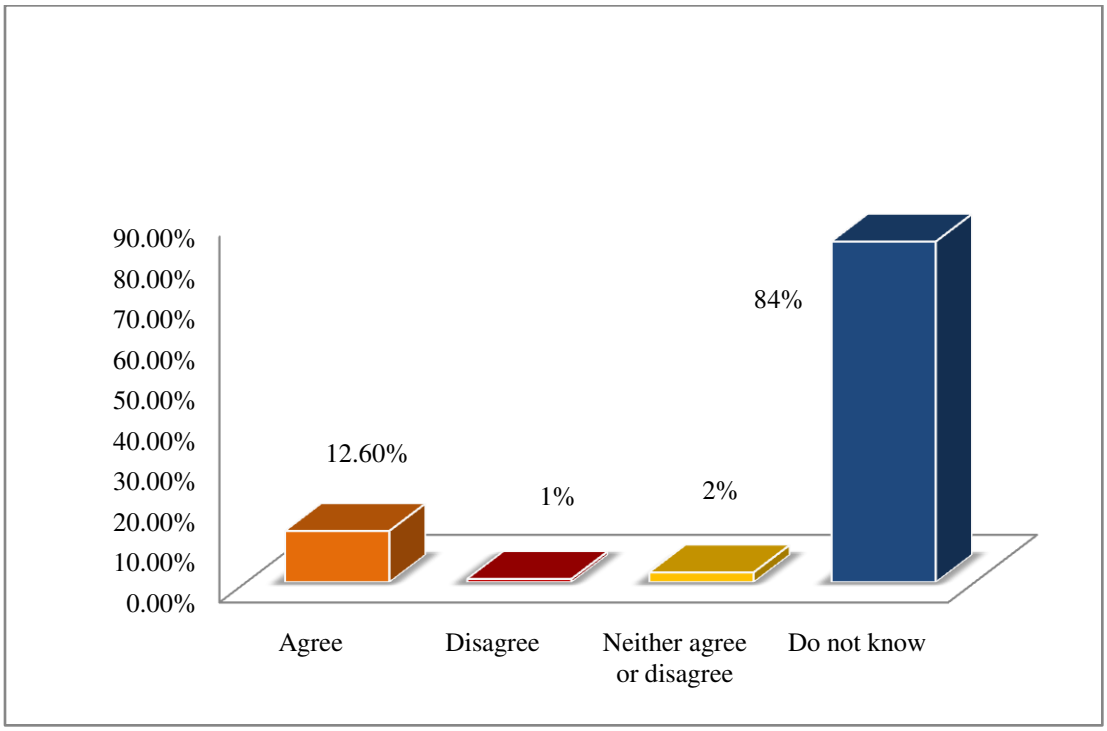

Figure 4.4.3: Antibiotic resistance due to self-medication of antibiotics

Majority of the respondents said that they do not know whether antibiotic resistance builds up
or not in case of the self-medication of antibiotics. Only a few respondents neither agree nor disagree on that statement of antibiotics resistance.

4.4.4 Antibiotic resistance is promoted by using antibiotics by using antibiotics with other drugs

Table 4.4.4: Antibiotic resistance is promoted by using antibiotics by using antibiotics with other drugs

Resistance occur due to using antibiotic with other drugs	Number	Percent
Agree	24	5.60%
Disagree	0	0%
Neither agree or disagree	14	3.60%
Do not know	454	90.80%
Total=500		

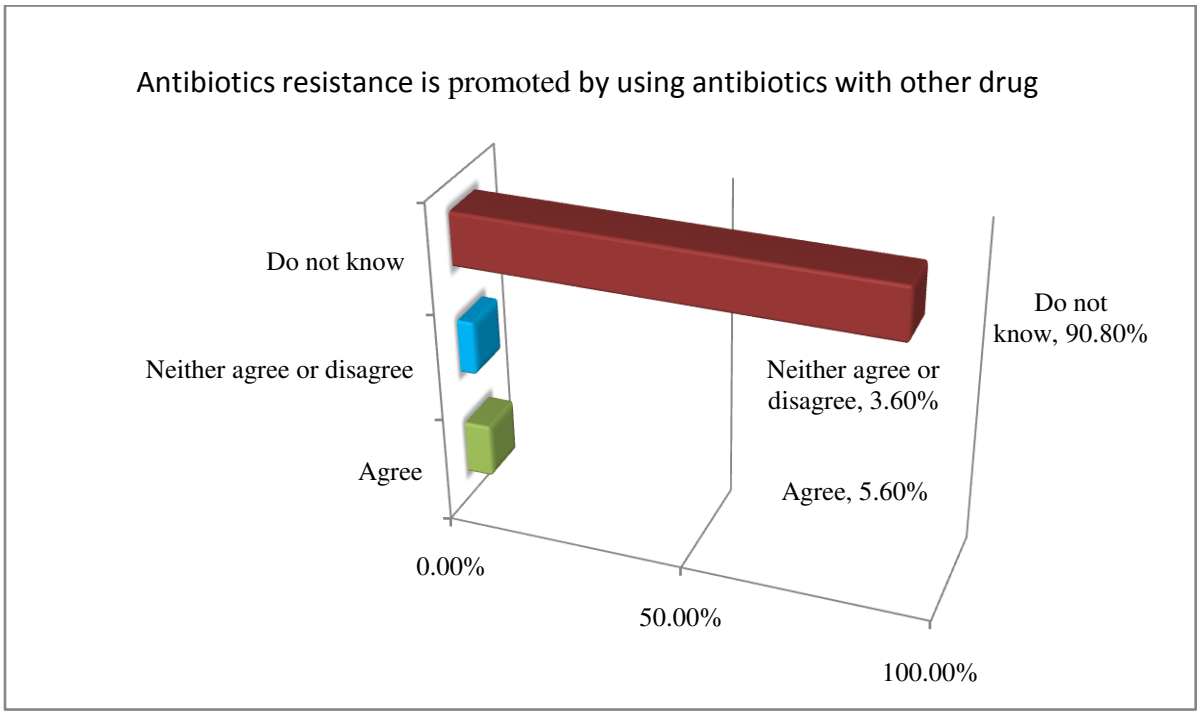

Figure 4.4.4: Antibiotic resistance is promoted by using antibiotics by using antibiotics with Other drugs.

Majority of the respondent's (90.80%) do not know whether antibiotic resistance is promoted by using antibiotics with other drugs or not. Only (5.60%) of respondent's knows.

4.4.5 Viral infection with fever should be treated with antibiotics

Table 4.4.5: Viral infection with fever should be treated with antibiotics

Viral infection with fever should be treated with antibiotics	Number	Percent
Agree	31	6%
Disagree	0	0%
Neither agree or disagree	15	3%
Do not know	454	91%
Total=500		

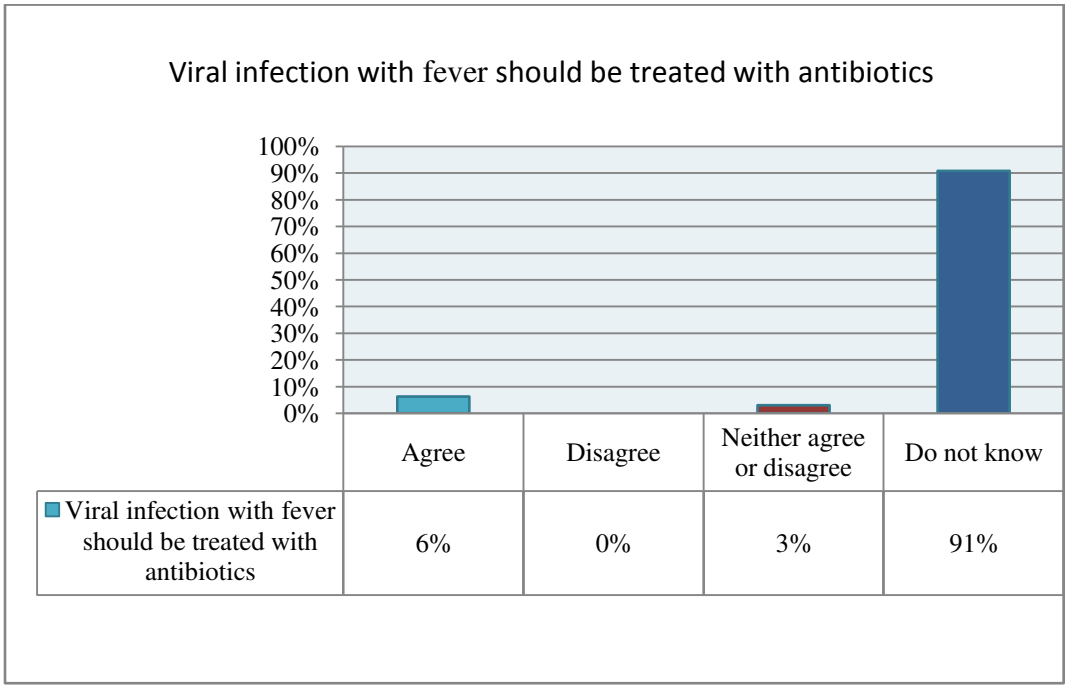

Figure 4.4.5: Viral infection with fever should be treated with antibiotics

Maximum of the respondents have said that they do not know about this. Another 3% respondent said they have agreed.

4.4.6 Effectiveness of antibiotics in the treatment of same infection in future

Table 4.4.6: Effectiveness of antibiotics in the treatment of same infection in future

Effectiveness of antibiotics in the treatment of same infection in future	Number	Percent
Agree	35	7%
Disagree	0	0%
Neither agree or disagree	13	3%
Don't know	452	90%
Total-500		

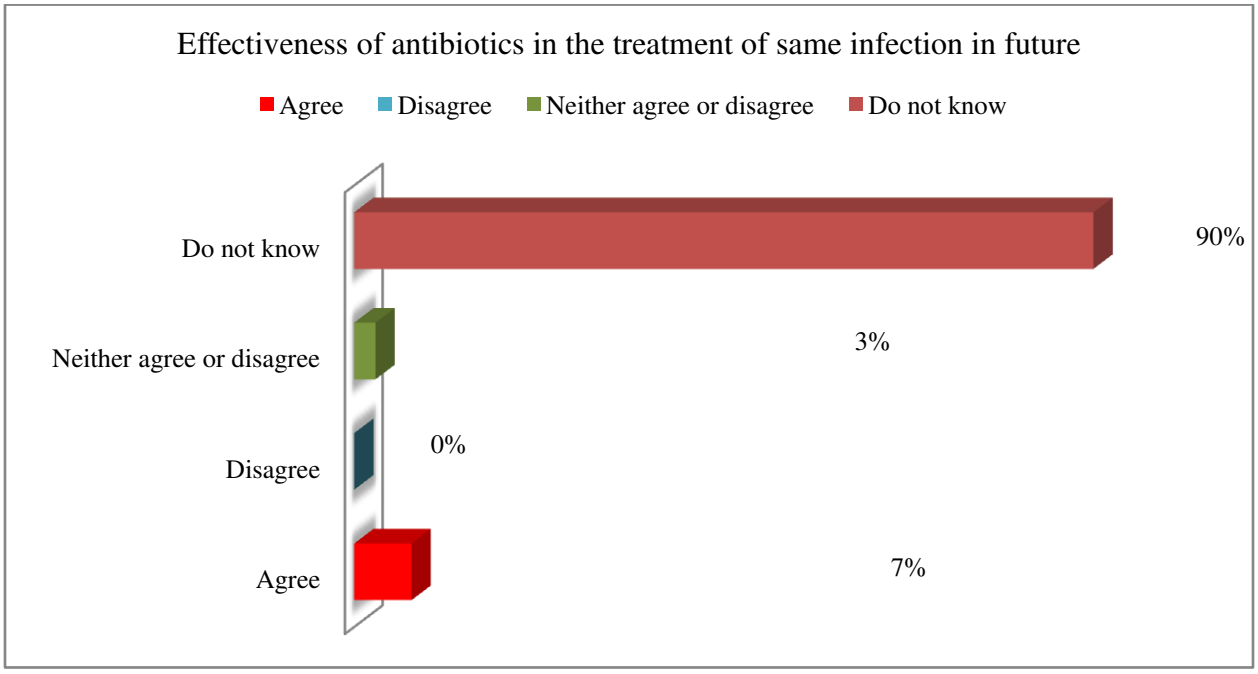

Figure 4.4.6: Effectiveness of antibiotics in the treatment of same infection in future

Majority of the respondents (90%) said that don't know about this.

CHAPTER – 05

Discussion & Conclusion

5.1 Discussion

A study was conducted on Bangladeshi parents' practice, knowledge and attitudes of self medication to their children in Madhnagar and Naldanga Thana of Natore district. From that study we can able to get an overview on parental knowledge and attitudes of self-medication, practice among children. After this study it is found that self-medication practice tendency of parents to their children is greatly depends on age of the children, previous experience, sort of disease, monthly net house hold income, & parent's education level etc. From the demographical data, we found that most of the cases of children are medicated by their mother (77%), the mother played active role in medication administration in children where fathers are second in this category (23%). Also from the education data most of the parents who medicated their children have education levels school certificate (44.80%) and primary school (10.00%), high school (30.00%) graduate level (6.40%) and post graduate level (7.80%). The occupation of the parents is homemaker (74.70%), studying (1.60%), un-employed (1.20%) and employed or others are (19.80%). The net household income is also a major contributor in self-medication practice where maximum parent's income is between Tk5000-10000 (11%) and Tk10000-30000 (56%) and TK 30000< (33%) which produces a great impact between self-medication and consulting a doctor for medicating their children during disease condition. From this study we have seen major of children who are medicated by antibiotics are 3 months to 1 year (55.60%) and 1year to 5 years (19.40%). Children were male (55.67%) and female (44.40%) whether they are1st (44.20%) or 2rd (55.20%) born and third born (3.60%). Male children number and female children number is almost same. Since majority of the responders had no health care degree; responders have shown difficulty in identifying the drugs and dosage regimen they followed for their children. This study showed the majority of the children are suffered from cough and cold (34.40%) few are suffered from fever (28.80%), pain and burring during urination (2%),some gastrointestinal disease like diarrhea (22.20%), skin wound or infection (10.20%) and others. The perception of the parents about health status of their children's is fairly poor (49.60%), from the opinion of most of the parents they responded by self medicating (19%) or consulting a doctor (81%). 96.84% people think that self-medication is not safer than the consulting a doctor. Parents are complaining some reasons e.g. self decision by parents (10.52%), high cost of treatment

(4.20%). Maximum people self medicate their children according to the previous prescription as reference. Many of them have been able to indicate the exact schedule of medication but (66.31%) have no adequate idea about the side effects of the medication prior to administering the drugs. Those of the respondents, who have gathered some information about the medication, have done it from sources such as the health care professionals (78%) or family and the friends (14.73%). Also 71.57% parents haven't proper knowledge about drug before administering that to children. Self medicated antibiotics are amoxicillin (10.05%), azithromycin (30.52%), and cefuroxime (2.10%) and ciprofloxacin (12.62%). The main source of collecting those antibiotics is from the OTC of dispensaries (70.52%) without any prescription. The not so strict enforcement of medical laws and regulations in Bangladesh enable clinic dispensers and pharmacists to sell the drugs to the people over-the-counter without a doctor's prescription. These attitudes were also due to lack of knowledge and awareness of the parents of the unnecessary undesirable effects and outcomes to the children as well as increasing bacterial resistance. Most prescribed antibiotics by the doctor's are cefixime (19.75%), ciprofloxacin (21.23%) & azithromycin (34.07%) and 99% respondents are agreed with the treatment schedule provided by the doctor, only1% is disagreed to the treatment due to some problem with the dosage regiment. Many who have visited the doctors thought that physicians prescribe drugs too easily to the children. Some respondents (9%) had request physician to give antibiotics and some of them (5%) had requested for a specific drug to physician. Some people (2%) have discontinued drug therapy and if shows any side effects, they don't understand due to the lack of knowledge about the consequences .When the parents were asked about antibiotic resistance then most of the respondents (76%) said that they do not have any idea about antibiotic resistance. This is because only few percent parents have health care degree and they are not supposed to know about antibiotic resistance. Most of the parents even think that the antibiotics will be effective in the same infection in future. Though some of the respondents have university level educational qualification but they do not have the proper knowledge about antibiotic resistance.

5.2 Conclusion

The results of this study confirm that, the prevalence of self-medication with antibiotics in children is a frequent problem in educated people in most in this area and sometimes illiterate people also in Madhnagar and Naldanga Thana of Natore district in Bangladesh.

From this study it also reveals that, the inadequate knowledge of parents about the resistance and practice of the self-medication is also play a vital role in misuse of antibiotics and promotes its resistance. Thus interventions at different levels are required in order to reduce the frequency of antibiotics misuse. Adequate health education to stop this unsavory practice needs to be mounted while efforts should be made to make qualitative health care readily available. Health care providers should educate patients on the dangers of self-medication such messages should be extended to the community at large periodically by government health ministries.

CHAPTER – 06

Reference

6. Reference

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