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A Retrospective Observational Study: To Assess and Evaluate Mortality and Morbidity in the Age Groups of Zero to Under-5 And Role of Clinical Pharmacist in Minimizing the Emergence of Paediatric Complications.

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Abstract

This retrospective observational study delves into the mortality and morbidity rates in under 5 children, focusing on prevalent conditions including respiratory tract infections, shock, sepsis, meningitis etc., The study analyses 1000 cases of in which mortality 300 and morbidity 700, providing comprehensive insights into the epidemiology, risk factors, and outcomes associated with these conditions. The findings highlight the urgent need for targeted interventions and early detection strategies to address the significant burden of these life-threatening illnesses among young children.

Background:

Respiratory tract infections, shock, sepsis, meningitis etc., collectively represent significant health challenges in paediatric populations, particularly among children under 5 years old. These conditions can lead to severe morbidity and mortality if not promptly identified and treated. Respiratory tract infections, including pneumonia and bronchiolitis, are leading causes of morbidity and mortality in children worldwide, especially in resource-limited settings. Shock, often resulting from severe infections or other critical illnesses, requires immediate medical attention to prevent adverse outcomes. Sepsis, a life-threatening condition resulting from the body's overwhelming response to infection, poses a substantial risk to paediatric patients. Meningitis, whether bacterial or viral, can lead to neurological sequelae or death if not promptly diagnosed and managed. Despite advances in medical care, these conditions continue to impose a significant burden on under 5 children globally. Thus, understanding the epidemiology, risk factors, and outcomes associated with these conditions is crucial for guiding public health interventions and improving paediatric healthcare delivery. This retrospective observational study aims to contribute valuable insights into the mortality and morbidity patterns of these conditions in under 5 children, facilitating informed decision-making and resource allocation for better paediatric health outcomes.

Key words:

Mortality, Morbidity, Paediatrics, Clinical pharmacist, Correlation, Significance,Shock,Respiratory Failure

INTRODUCTION:

"Mortality and morbidity in children represent critical indicators of public health, reflecting the well-being of a society's youngest members. Mortality refers to the rate of death, while morbidity encompasses the prevalence of illness, injury, and disability. Understanding these measures is paramount for policymakers, health care providers, and communities to implement targeted interventions and improve the overall health outcomes of children worldwide."

The well-being of children under five years old is a critical indicator of a society's health infrastructure and its commitment to future generations. Despite significant advancements in paediatrics medicine, mortality and morbidity rates among this vulnerable demographic remain a global concern.

It Is essential to recognize the significant progress that has been made in reducing mortality and morbidity rates among children globally. Advances in health care interventions, vaccination programs, and public health initiatives have contributed to notable declines in child mortality over the past decades. However, disparities persist, with marginalized communities often bearing the heaviest burden of preventable childhood illnesses and deaths. Children under 5 years of age constitute approximately 15% of the country's total population. The first 1000 days of life is the most crucial period, as this age is known for its high growth rate and development. They constitute the most vulnerable section of society and suffer from the highest morbidity. Good personal hygiene and sanitary condition of living now forms a part of primary health prevention strategy and it is found to be effective for reducing morbidity and mortality in children.[3]

The under-five mortality rate refers to the probability a newborn would die before reaching exactly 5 years of age, expressed per 1,000 live births. In 2022, 4.9 million children (about twice the population of Mississippi) under 5 years of age died. This translates to 13,400 children under the age of 5 dying every day in 2022. Globally, infectious diseases, including pneumonia, diarrhea, and malaria, remain a leading cause of under-five deaths, along with preterm birth and intrapartum-related complications. Neonatal mortality defined as a death during the first 28 days (about 4 weeks) of life and is the most critical phase of child survival. [16]

Child mortality under the age of 5 consists of several subgroups. These are neonatal mortality (birth—the first month of life), infant mortality (birth—the first year of life), and child mortality (1–5 years). In retrospective observational study, we have observed total samples of 1000 in which 300 are mortality and 700 are morbidity samples. Mostly the common diseases for mortality are shock, respiratory distress, HIE and low birth weight. There are also co-morbidity conditions in which we observe respiratory diseases + shock, HIE+ shock, sepsis + shock. In morbidity conditions we observe mostly respiratory tract infection like pneumonia, seizures, anaemia , thalassemia.

The mortality and morbidity occurred more to males compared to females in age groups of less than 1 year (morbidity) and 1 day (mortality). This is due to the residence area, low income, vaccination, marital life, mode of delivery and pregnancy complications.

DEFINITION: -

MORTALITY: Mortality encompasses the occurrence of death within a defined population or group over a specified time frame, typically expressed as a rate relative to the population size. It signifies the state of being susceptible to death and is often subdivided into medical research and clinical practice based on factors like age, cause of death, and underlying health conditions.

MORBIDITY: Morbidity describes the health status of a population or group, indicating the presence of disease or illness. It encompasses the prevalence or incidence of various health-related conditions within a specified population over a defined period. Monitoring morbidity provides crucial insights into the burden of disease, helps identify risk factors, and informs health care planning and resource allocation to enhance population health and well-being. Despite remarkable reductions in child mortality globally, more than 5 million children (about twice the population of Mississippi) died in 2019, predominantly in low-income and middle-income

countries (LMICs).[1] child mortality in rural areas is substantially higher than in urban areas.[15]

Mortality in patients depends on many factors such as demographic and clinical characteristics of a population, infrastructure and non-medical factors (management and organization), case mix, and admission practice, it is also affected by ICU performance.[2] An educated mother would ensure routine health checkups, timely vaccination, proper hygiene, and a nutritious diet for her children, resulting in low morbidity and mortality.[3]

The mortality rate or death rate is a measure of the number of deaths in a population, in a definite period. Progress in reducing under-5 mortality is a key indicator of a country's overall development and its commitment to ensuring the well-being of future generations. Under-five morbidity and mortality rates are often influenced by socioeconomic factors, including poverty, lack of education, and limited access to health care services.[27]

Disparities in these rates may exist within countries, affecting vulnerable populations more severely. Understanding the various factors contributing to under-5 morbidity is crucial for designing and implementing effective public health strategies. These efforts focus not only on treating illnesses but also on preventing them through education, vaccination, improved nutrition, and overall enhancements in health care infrastructure and access. The risk of mortality and morbidity is high when compared in non-breast feed when compared to breastfeeding infants.[12]

Acute lower respiratory infections (ALRI), such as pneumonia and broncholitis, are the leading cause of morbidity and mortality in children under five years of age. According to recent estimates, every year about 120–156 million cases of ALRI occur globally with approximately 1.4 million resulting in death. More than 95% of these deaths occur in low- and middle-income countries (LMIC).[6]

Shock is one of the most common life-threatening presentations in paediatrics and accounts for 2% of all paediatric admissions to casualty worldwide. Around 10 million children die of shock annually worldwide. The highest mortality rate is in the under 5s in developing countries. Sepsis is the cause in the majority of paediatric cases (57%) and has a high mortality rate ranging from 5% in developed countries to 35% in developing countries.

The leading causes of death in children under 5 years are preterm birth complications, birth asphyxia/trauma, pneumonia, diarrhoea and malaria, all of which can be prevented or treated with access to affordable interventions in health and sanitation.[8]The risk of SAM was independently associated with 6 factors, namely, illiteracy among mothers, incomplete immunization, practice of bottle feeding, consistency of complementary feeding, deprivation of colostrum and receipt of prelacteals at birth.[14]

The U5MR is closely related to some negative socioeconomic factors (malnutrition, low immunization rates, poor maternal health, and education). Therefore, it is a strong indicator of inequality and systemic health problems.[21]

At the same time, as many of these deaths are preventable, the rate reflects better than any other measure the lack of access to critical and essential quality health care, including family planning, antenatal and postnatal services, and disease prevention and case management.[17]

EPIDEMIOLOGY:

In 2022, the annual number of under-five deaths dropped to 4.9 million. And since 2000, the global under-five mortality rate (U5MR) has declined by more than half.[10]. Under 5 Mortality Rate (U5MR) in India is 35 per 1000 live births in 2019 and 32 per 1000 live births in 2020.

It varies from 36 in rural areas to 21 in urban areas. Globally under 5 mortality rates have shown

a decline by 93 deaths per 1000 live births in 1990 to 38 deaths per 1000 live births in 2021. Around the world, remarkable progress in child survival has been made and millions of children have better survival chances than in 1990. The under-5 mortality rate fell to 39 deaths per 1000 live births in 2018, from 93 in 1990-a 58 per cent reduction. This is equivalent to 1 in 11 children dying before reaching age 5 years in 1990, compared to 1 in 26 in 2018. In most of the SDG regions, the under-5 mortality rate was reduced by at least half since 1990. The total number of under-5 deaths dropped to 5.3 million in 2018 from 12.6 million in 1990. [23]

Despite progress over the past 2 decades, millions of new-borns and children die every year, mostly from preventable or treatable causes such as infectious diseases and injuries. These deaths reflect the limited access of children and communities to basic medical treatment of infectious diseases, adequate nutrition, health interventions such as vaccination, clean water and sanitation.

Children face wide-spread regional and income disparities in their chances of survival. On average, boys are expected to have a higher probability of dying before reaching age 5 years than girls. The estimated under-5 mortality rate in 2018 was 41 deaths per 1000 lives birth for boys and 36 deaths per 1000 live births for girls. In 2017, an estimated 2.9 million boys (about the population of Connecticut) and 2.5 million girls under 5 years of age died. On average, 14,520 children died every day in 2018, as compared to34,000in1990.[20]

Each year about 27 million children (about the population of Texas) are born in India. Around 10 per cent of them do not survive to 5 years of age. In absolute figures, India contributes to 25 per cent of the over 5.3 million under-five deaths occurring worldwide every year. Nearly 62 per cent of the under-five deaths occur in neonatal period, 20 per cent takes place on the day of birth, and 49 per cent within the first 7 days [8]. A recent analysis showed that children in the poorest households are nearly twice likely to die before the age of 5 as those from the richest. The risk of death in rural areas is 1.5 times higher than for children in the urban areas and within urban areas children from poorer household tend to have higher mortality rates. Children of mothers who lack any education are 2.6 times more likely to die before reaching 5 years of age. Poor air quality is another risk factor for child mortality [3]

Two measures commonly used for epidemiological surveillance are morbidity and mortality. These measures describe the progression and severity of a given health event. They are useful tools to learn about risk factors of diseases and compare health events and between different populations. While similar and often related, morbidity and mortality, however, are not identical. Morbidity and mortality are two types of retrospective information that allows for continuous evaluation of the efficacy of either a specific health care system or an implemented intervention in place. For example, the use of maternal morbidity and mortality to gauge the risks of pregnancy and childbirth, as well as the efficacy of the health care they receive, are of vital importance.

ROLE OF CLINICAL PHARMACIST:

Clinical Pharmacists play a crucial role in promoting child health and reducing morbidity and mortality in children under five (U5). Their responsibilities extend beyond dispensing medications to encompass various aspects of health care delivery and community engagement. Comprehending the patterns of paediatrics morbidity and mortality is crucial for crafting impactful preventive measures, enhancing health care provision, and advancing child welfare. Here are some key roles that pharmacists can play in addressing morbidity and mortality in U5: Offer health education to caregivers on topics such as nutrition, hygiene, and home-based management of common childhood illnesses. This can contribute to early detection and appropriate management. Educate caregivers about the importance of childhood vaccinations and assist in promoting and administering vaccines as part of immunization programs.

Stay updated on paediatric pharmacotherapy and health care guidelines to provide evidence-

based and up-to-date information to caregivers and health care teams. Collaborate with physicians, nurses, and other health care professionals to ensure comprehensive and coordinated care for children, especially those with chronic illnesses. Provide guidance on age-appropriate nutrition for children, including advice on breastfeeding, introduction of complementary foods, and managing nutritional deficiencies.

Engage in community outreach programs to increase awareness of childhood health issues, promote health-seeking behaviours, and facilitate access to health care services Collaborate with health care professionals to provide support for maternal and child health initiatives, including prenatal care, family planning, and postnatal care. Educate caregivers on the proper use of antibiotics, emphasizing the importance of completing prescribed courses and avoiding unnecessary antibiotic use, which can contribute to antimicrobial resistance.[30]

The role that the paediatric clinical pharmacist played at the hospital was valuable as it highlighted the gaps in patients' and parents' understanding of their medication profile. Clinical pharmacist's participation has shown to reduce and prevent the number of medication errors, ADRs, and in turn, reduced mortality, and morbidity rates. Thus,

Concluding that the interaction between clinical pharmacists and physicians influence the teamwork and also provides better patient care.[7]

MORTALITY AND MORBIDITY IN UNDER -5 CHILDREN:

Most epidemiological studies begin with mortality data. Mortality data are relatively easy to obtain, and, in many countries, reasonably accurate.

Many countries have routine systems for collecting mortality data. Each year, information on deaths is analysed and the resulting tabulations are made available by each government. Mortality data provide the starting point for many epidemiological studies. In fact, they are the major resource for epidemiologists.
Morbidity has been defined as "any departure, subjective or objective, from a state of physiological well-being". The term is used equivalent to such terms as sickness, illness, disability etc. [22.] The WHO Expert Committee on Health Statistics noted in its 6th Report that morbidity could be measured in terms of 3 units

(a)Persons who were ill;
(b)The illnesses (periods or spells of illness) that these persons experienced;
(c)the duration (days, weeks, etc.,) of these illnesses

The study performed was a retrospective cross-sectional study of mortality in children under five (U5) which involves analyzing past data to understand the prevalence, patterns, and determinants of both deaths and illnesses in this age group.

This type of study is useful for identifying trends, risk factors, and potential areas for intervention. The cross- sectional nature of the study examines data at a specific point in time, providing a snapshot of mortality and morbidity among U5 children.

While examining the morbidity and mortality of the cases the parameters that are taken into consideration are age, gender, weight, disease state, vaccination, type of marriage, educational status, residential area.

OTHER CAUSES OF MORTALITY AND MORBIDITY:

Under nutrition continues to be a primary cause of ill-health and premature mortality among children in developing countries.[21]

Diarrhoea is a leading killer of children under five years of age globally. According to the United Nations Children's Fund (UNICEF), it accounted for nine percent of all deaths among children lower than five years old globally in 2015. The prevention and management of diarrhoea depends on the level of knowledge and awareness about the use of ORS, and other practices at home. [9]

The control of childhood infections has been advocated as a major strategy to reduce child deaths under Millennium Development Goals.
The estimation of stroke mortality was seriously limited by the method of classification of cause of death in the country.ARI, mainly pneumonia, accounts for about 18% of underlying causes of death in developing countries. Pneumonia and other ARI are frequent complications of measles and pertussis; ARI is also commonly found after other infections and in association with severe malnutrition.[11]
Premature birth is the leading cause of neonatal death and second leading in children under 5.[8]

CAUSES

Maternal health:
A major determinant of a child's health is the health of his/ her mother. Child health is adversely affected (the risk begin to appear even before birth) if the mother is malnourished, if she is under 18 years (too young) or over 35 (too old), if her last child was born less than 2 years ago (too close), if she has already more than 4 births (too many) and if she is deprived of basic pregnancy care. A healthy mother brings forth a healthy baby, with better chances of survival. [24]

Family:
In pre-school years, the child is very much an organic part of the immediate family. Family. Whatever happens to him or her affects the other members of the family, and vice verse. Therefore, "child health" must be "family health". It depends upon the family's physical and social environment, which includes its lifestyle, customs, culture, traditional habits, and the childbearing and child rearing practices are greatly influenced by this. The family and social environment has a considerable influence on the development of speech, personality and the intellectual potential of the small child. Other factors are family size, family relationships, and family stability. Infancy and early childhood are the time when the child contracts common contagious illnesses from contact with others (elder brothers and sisters, playmates, schoolmates). Data shows that the number of episodes of infectious diarrhoea increases with the size of the family. Studies also show an increase in the prevalence of malnutrition in families with more than 4 children. In short, fewer children would mean better nutrition, better health care, less morbidity and lower infant mortality. [23]

Socioeconomic circumstances:
The socioeconomic situation in which the family is placed is a very important factor in a child's health. In every region of the world, the physical and intellectual development of children varies with the family's socioeconomic level.

Under-privileged children of the same age are smaller, lighter and less advanced in psycho motor and intellectual performance, compared to children of privileged group. A detailed analysis of socioeconomic factors shows the part played by the parents' education, profession and income, their housing, the urban or rural, industrialized or non-industrialized nature of the population.[40]Poverty, illiteracy (especially mothers' illiteracy) and sickness create a vicious circle spanning from one generation to the next, and from which it is difficult for the individual to escape. The differences in health between rich and poor, which can be observed in all age groups, are particularly striking among children.

Environment:
After the first week of a child's life, the environmental factors play a very great role as

determinants of infant and childhood morbidity and mortality. Tetanus infection of the newborn may take a heavy toll on the newborn in the first few weeks of life.

Diarrhoea, pneumonia and other infections bacterial, viral and parasitic common in children exposed to insanitary and hostile are extremely environment. The stages at which these infections occur vary according to the ecological conditions, home and family hygiene, local epidemiological conditions and the extent to which they encounter earth, water and above all with adults and other children

Social support and health care:
Other factors affecting the health status of children include community and social support measures, ranging from creches and day care facilities to organized health care systems. [25]

About two-thirds of all perinatal deaths occur among infants with less than 2500 g (about 5.51 lb.) birth weight. The causes involve one or more complications in the mother during pregnancy or labor, in the placenta or in the fetus or neonate.

Main causes: The main causes of death are intrauterine and birth asphyxia, low birth weight, birth trauma, and intrauterine or neonatal infections.
The various causes of perinatal mortality may be grouped as below:

(a) Antenatal causes

- Maternal diseases, hypertension, cardiovascular diseases, diabetes, tuberculosis, anaemia
- Pelvic diseases: uterine myomas, endometriosis, ovarian tumors
- Anatomical defects uterine anomalies, incompetent cervix
- Endocrine imbalance and inadequate uterine preparation
- Blood incompatibilities
- Malnutrition
- Toxaemia of pregnancy
- Antepartum haemorrhage
- Congenital defects
- Advanced maternal age

(b) Intranatal causes

- Birth injuries
- Asphyxia
- Prolonged effort time
- Obstetric complications

(c) Postnatal causes

- Prematurity
- Respiratory distress syndrome
- Respiratory and alimentary infections
- Congenital anomalies

(d) Unknown causes

- In some cases, the causes are not clinically ascertainable-birth weight of an infant is the single most important determinant of its chances of survival, healthy growth and development.
- There are two main groups of low-birth-weight babies –
- Those born prematurely (short gestation); and
- Those with fetal growth retardation

Some of the problems premature babies may experience include:
• Temperature instability - inability to stay warm due to low body fat
• **Respiratory problems**
-hyaline membrane disease/respiratory distress syndrome a condition in which the air sacs cannot stay open due to lack of surfactant in the lung -chronic lung disease/bronchopulmonary dysphasia- long-term respiratory problems caused by injury to the lung tissue
-air leaking out of the normal lung spaces into other tissues

-incomplete lung developments
-apnoea (stopping breathing) occurs in about half of babies born at or before 30 weeks
Cardiovascular
-patent ducts arteriosus (PDA) a heart condition that causes blood to divert away from the lungs
-too low or too high blood pressure
-low heart rate often occurs with apnoea
Blood and metabolic
-Anaemia – may require blood transfusion
-Jaundice due to immaturity of liver and gastrointestinal function -too low or too high levels of minerals and other substances in the blood such as calcium and glucose (sugar)
Gastrointestinal
-difficulty feeding many are unable to coordinate suck and swallow before 35 weeks' gestation
-poor digestion
-necrotizing enterocolitis (NEC) a serious disease of the intestine common in premature digestion
Neurologic
-seizures – may be due to bleeding in the brain
-retinopathy of prematurity – abnormal growth of the blood vessels in a baby's eye
-intraventricular haemorrhage – bleeding in the brain
-periventricular leukomalacia – softening of tissues of the brain around the ventricles (the spaces in the brain containing cerebrospinal fluid).
-poor muscle tone
Infections – premature infants are more susceptible to infection and may require antibiotics

PAEDIATRIC CARE:
Clinical Reproductive care – Family planning.
STIs, HIV and immunizations.
Care after pregnancy loss.

CHILDBIRTH CARE:
-Skilled care and immediate
-newborn care hygiene, warmth. Breast-feeding and resuscitation Antenatall steroids, antibiotics for PPROM
-PMTCT of HIV
-Emergency obstetric care if needed.

EMERGENCY NEWBORN CARE:
-Extra care of preterm babies, including Kangaroo Mother Care.
-Emergency care of sick newborns (context-specific e g CPAP, surfactant).

EMERGENCY CHILDCARE:
-Hospital care for childhood illness including HIV care Outpatient.

REPRODUCTIVE HEALTH CARE:
-Family planning. Including birth spacing.
-Prevention and management of STIs and HIV.
-Nutritional counselling

ANTENATAL CARE:
-4-visit focused ANC package
-IPTp and bed nets for malaria.
-Prevention and management of STI and HIV.
-Calcium supplementation
-Diagnosis and treatment of maternal chronic conditions.

POSTNATAL CARE:
-Promotion of healthy behaviours, e.g. hygiene. Breastfeeding, warmth
-Early detection of and referral for illness
-Extra care of at-risk mothers and babies Prevention of mother to child transmission of HIV

CHILD HEALTH CARE
-Immunization, nutrition. Vit A. supplementation and growth monitoring
IPTi and bed nets for malaria
Care of children with HIV, including cotrimoxazole
-First level assessment and care childhood illness (IMC)
-Diagnosis and treatment prematurity associated disability

HEALTHY HOME CARE INCLUDING: -
Promoting preventive care, including newborn care (hygiene, warmth), nutrition (exclusive breast-feeding, feeding) and family planning for women. Complementary
-Seeking curative services for women, babies and children, including oral re-hydration salts for prevention of diarrhoea, and where referral is not available, consider case management for pneumonia, malaria and neonatal sepsis [15]

PREVENTIVE AND SOCIAL MEASURES:
High maternal mortality reflects not only in inadequacy of health care services for mothers, but also a low standard of living and socio-economic status of the community.
The world, the problem of maternal mortality is principally one of applying existing obstetric knowledge through antenatal, intranatal and postnatal services rather than developing new skills. Any attempt to lower MMR must take into consideration the following measures:

- Early registration of pregnancy;
- At least four antenatal check-ups;
- Dietary supplementation, including correction of anaemia;
- Prevention of infection and haemorrhage during puerperium;
- Prevention of complications, e.g., eclampsia, malpresentations, ruptured uterus;
- Treatment of medical conditions, hypertension, diabetes, tuberculosis, etc.; e.g.,
- Anti-malaria and tetanus prophylaxis;
- Clean delivery practice;
- In India, many maternal deaths could be prevented with the help of trained village level health workers;
- Institutional deliveries for women with bad obstetric history and risk factors;
- Promotion of family planning to control the number of children to not more than two, and spacing of births;

MATERIALSAND METHODS

STUDY SITE: The study was conducted in pediatric department at maharaja institute of medical sciences (MIMS), Nellimarla, Vizianagaram.

STUDY PERIOD: The study was conducted for a period of 8 months.

STUDY DESIGN: Retrospective observational study.

SAMPLE POPULATION: A total of 1000 patients Enrolled in the study.

STUDY CRITERIA: The study criteria were enrolled inpatients and outpatients of Maharaja Institute of medical sciences, Nellimarla, Vizianagaram.

INCLUSION CRITERIA:

- Subjects who signed the informed consent form prior to study procedure.
- under 5 years of age are included in the study.

- Pregnant women and postpartum women of age between 18 to 40 years

EXCLUSION CRITERIA:

- Children of 5 or above 5 years were often excluded from the study procedure.
- Patients who are not willing to provide ICF.
- Pregnant women and postpartum women below 18years of age are excluded.
- Women who will not be able to provide the complete information about their health condition and child immunization details.

STUDY PLAN

PHASE 1:

- Obtaining consent from the hospital authority.
- Obtaining ICF from individuals.
- Literature survey.
- Designing data collection form.
- Taking patients' demographics data.
- Data collection.
- Case Review.

PHASE 2:

- Evaluation of etiological factors causing mortality and morbidity in U-5 years of age.
- Assess the impact of Age, Maternal age, Socioeconomic factors in U-5 years of age.
- Data validation.
- Statistical analysis.

OUTCOMES OF STUDY:

1. Morbidity Patterns: The study can identify prevalent diseases and health conditions affecting children in this age group, providing insights into the burden of illnesses such as respiratory infections, gastrointestinal disorders, and other common childhood ailments.
2. Mortality Trends: Analysis of mortality data can highlight leading causes of death among young children, shedding light on preventable factors and areas for targeted interventions.
3. Pharmacist Interventions: Assessing the role of clinical pharmacists can reveal specific interventions that have contributed to minimizing complications. This might include medication reconciliation, dose adjustments, patient education on drug administration, and monitoring for adverse effects

RESULTS

Here are the results of the parameters that are taken into consideration of the study.

MORTALITY

1. AGE

AGE	NO.OF CASES	PERCENTAGE
1 /365 days	136	45%
2 days- 1 months	56	19%
>1 month- <1 year	85	28%
U5 years	23	8%

Fig 1.1 Tabular representation of child mortality age

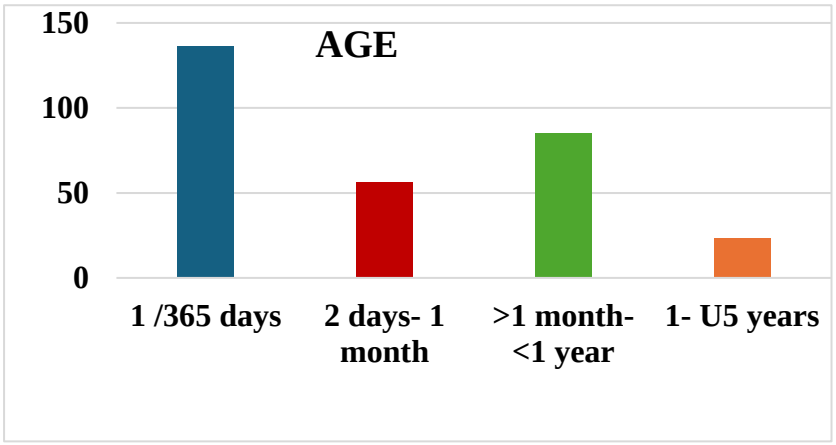

Fig 1.2 Graphical representation of child mortality age

The age groups that are taken into consideration are under five years of age. A total of 300 samples have been recorded. Among those samples, children of 1 month age are 136, children under the age of one year are 141 and children from one to under five years are 23 in number. The highest mortality 64% is seen in children of one month age, followed by 28% of children below one year of age and the least mortality 8% is seen in the age groups from one to under five years.

2. GENDER

GENDER	NO.OF CASES	PERCENTAGE
Male	181	61%
Female	119	39%

Fig 2.1 Tabular representation of gender

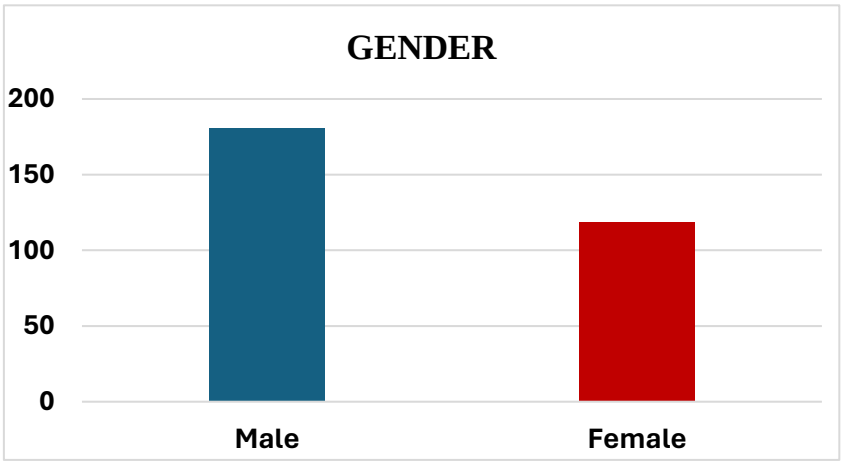

Fig 2.2 Graphical representation of gender

Both the male and female genders are taken in the study. A total of 300 samples are taken out of which 181 are males and 119 are females. The highest mortality 61% is seen in males while female account for 39%.

3. MATERNAL AGE

MATERNAL AGE	NO.OF CASES	PERCENTAGE
18-25	255	85%
26-33	22	7%
34-40	23	8%

Fig 3.1 Tabular representation of maternal age

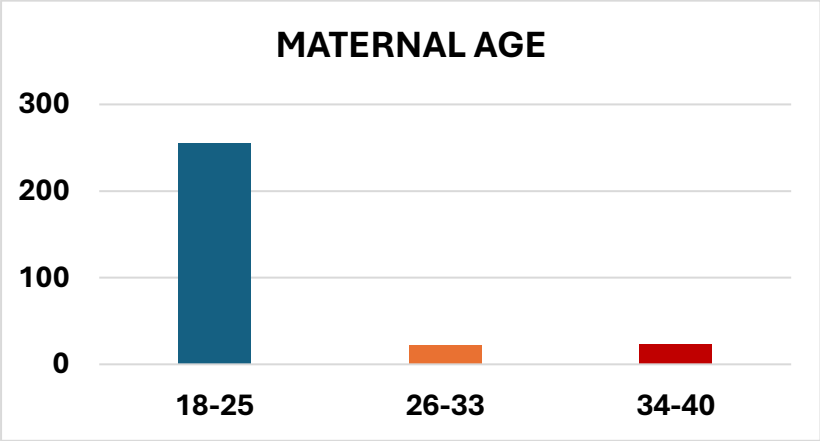

Fig 3.2 Graphical representation of maternal age

The age groups of mothers that are taken in the study are 18 to 40 years which are calculated in three different categories. The age group from 18-25 years have 255, 26-33 years have 22 and 34-40 years have 23 in number. The highest mortality 85% is seen in mothers of age group 18-25, 8% mortality in age group 34-40 years and least mortality 7% in age group 26-33 years.

4. MODE OF DELIVERY

MODE OF DELIVERY	NO.OF CASES	PERCENTAGE
Normal	190	63%
Caesarean	110	37%

Fig 4.1 Tabular representation of mode of delivery

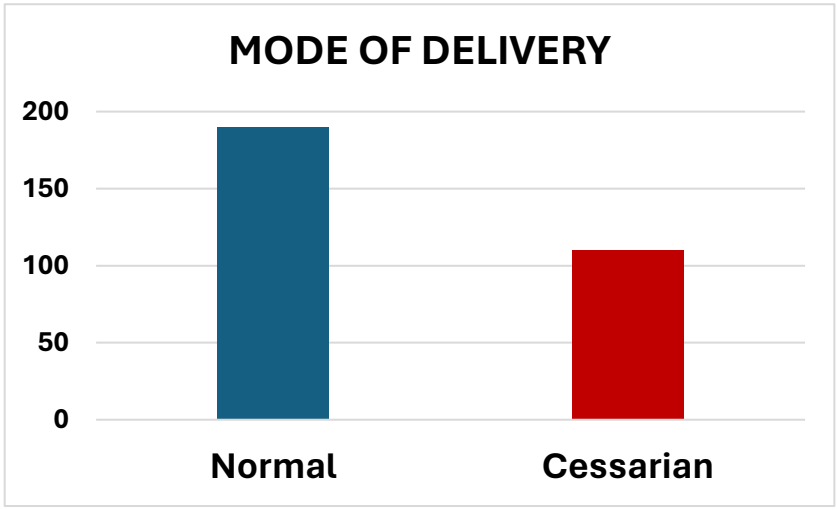

Fig 4.2 Graphical representation of mode of delivery

The mode of delivery also plays a role in mortality of child. The modes that we have taken in our study are normal delivery and caesarean delivery. Among the 300 samples normal delivery accounts for 190 and caesarean accounts or 110 in number. The highest mortality with 63% is seen in normal delivery and low mortality with 37% is seen in caesarean delivery.

5. RESIDENTIAL AREA

RESIDENTIAL AREA	NO.OF CASES	PERCENTAGE
Rural	217	72%
Urban	83	28%

Fig 5.1 Tabular representation of residential area

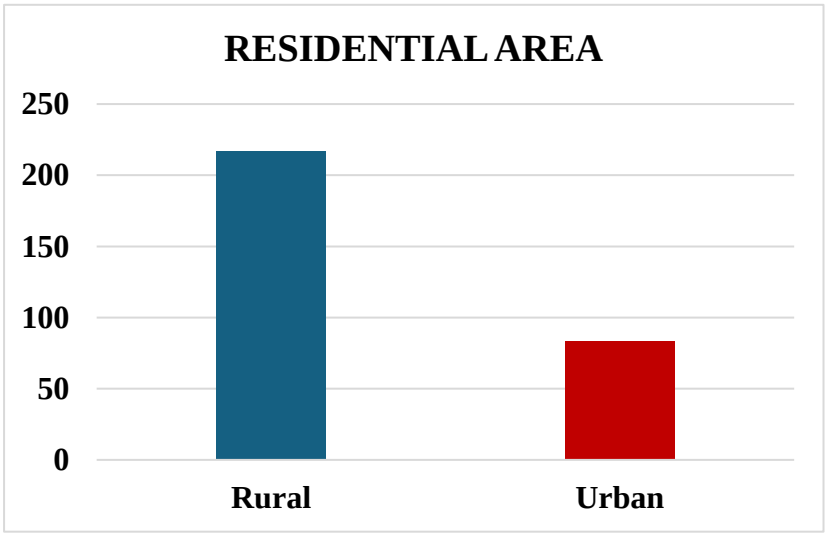

Fig 5.2 Graphical representation of residential area

Area of residence plays and important role in mortality of children. As there are more chances of rural people being illiterates when compared to urban people. From the total number rural account for 217 and urban account for 83 in number. The rural residents are seen having a high mortality of 72% while the urban residents are having a mortality of 28%.

6.TYPE OF MARRIAGE

MARRIAGE	NO.OF CASES	PERCENTAGE
NCM	194	65%
1CM	44	15%
2 CM	25	8%
3CM	37	12%

Fig 6.1 Tabular representation of marriage

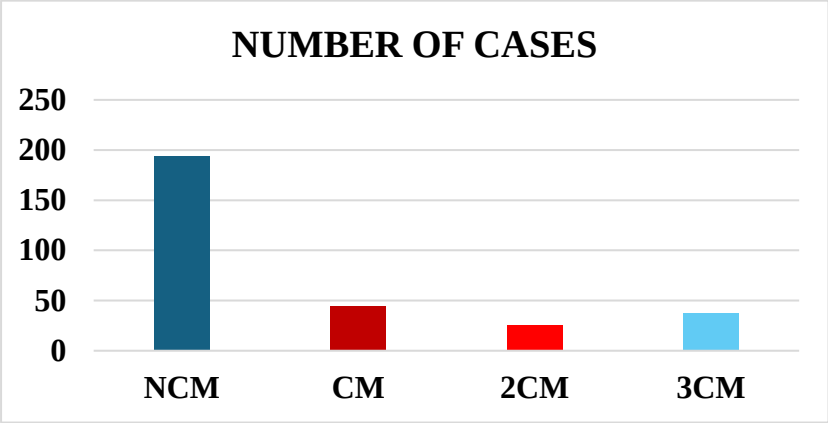

Fig 6.2 Graphical representation of marriage

Type of marriage results in birth complications, under this the mortality rate get increased. Non consanguineous marriages (NCM) are of highest samples out of 300 samples with a 194(65%). There are three types of consanguineous marriage are primary, secondary, tertiary. Primary CM with 44(15%), secondary CM with 25 (8%) and tertiary CM with 37(12%).

7.MORTALITY UNDER 5YRS OF CHILDREN

DISEASE STATE	NO.OF CASES	PERCENTAGE
Shock	67	22%
Respiratory failure	63	21%

Sepsis	27	9%
Respiratory distress	25	8%
Pneumonia	15	5%
Meningitis	14	5%
HIE	14	5%
Seizures	12	4%
Low birth weight	8	3%
Congenital	5	1%
Other	50	17%

Fig 7.1 Tabular representation of mortality under 5yrs of children

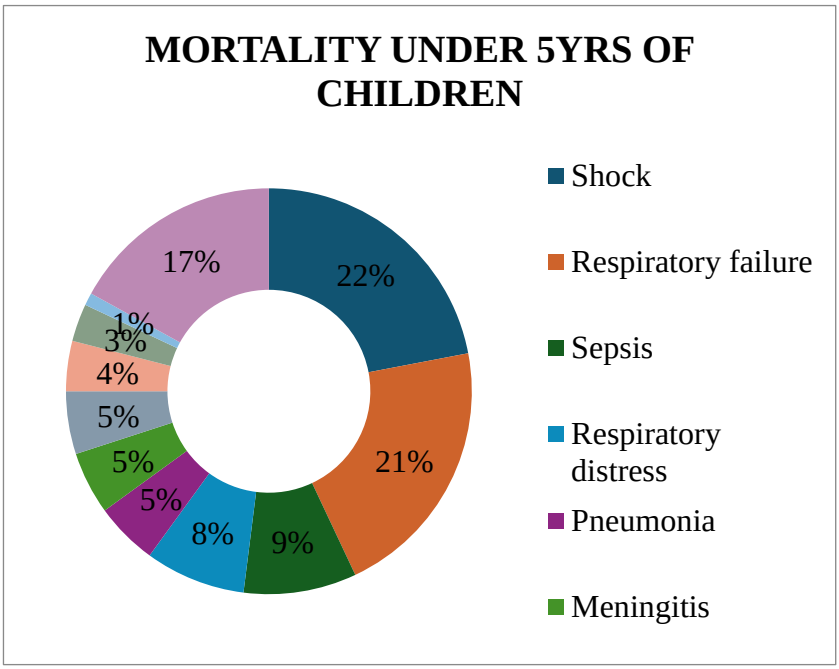

Fig 7.2 Schematic representation of mortality under 5yrs of children

The above shown pie chart displays the vital parameter that causes mortality. A huge number of disease states are encountered which lead to mortality. Among the observed 300 samples a major of four diseases that is shock, respiratory failure, sepsis, respiratory distress and pneumonia have been recorded.

8.COMORBIDITY WHICH LEADS TO MORTALITY

COMORBIDITY	NO.OF CASES
Respiratory + Shock	67
Respiratory +Hie	14
Respiratory+Sepsis	27
Respiratory +Rds	25
Low Birth Weight	8
Congential	5
Meningites	14
Seziuers	12
Pneumonia	15
Other	50

Fig 8.1 Tabular representation of comorbidity which leads to mortality

While the minor contribution consists of meningitis, HIE, seizures, low birth weight, congenital and others. Of the major disease states shock accounts for 67, respiratory failure for 63, sepsis for 27, respiratory distress for 25, and pneumonia for 15 in number respectively. While the remaining disease states account as follows, meningitis for 14, HIE for 14, seizures for 12, low birth weight for 8, congenital for 5 and the others for 50 in number respectively. The disease state which shows highest mortality which is of 22% is shock while the one that shows least mortality is congenital 1%.

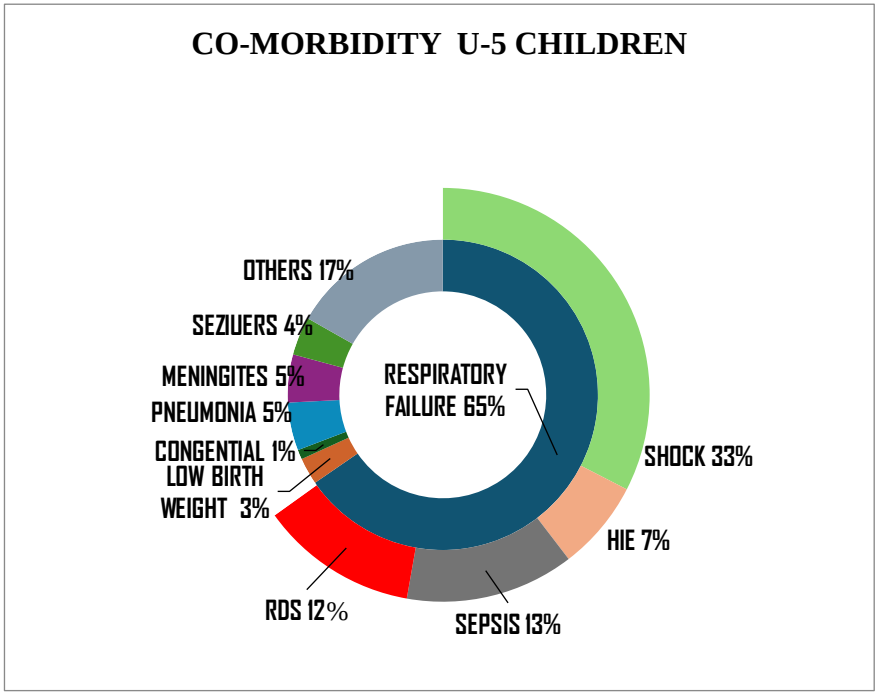

Fig 8.2 Schematic representation of comorbidity which leads to mortality

9. CORRELATION BETWEEN CHILD MORTALITY AGE GROUP AND DISEASE STATE

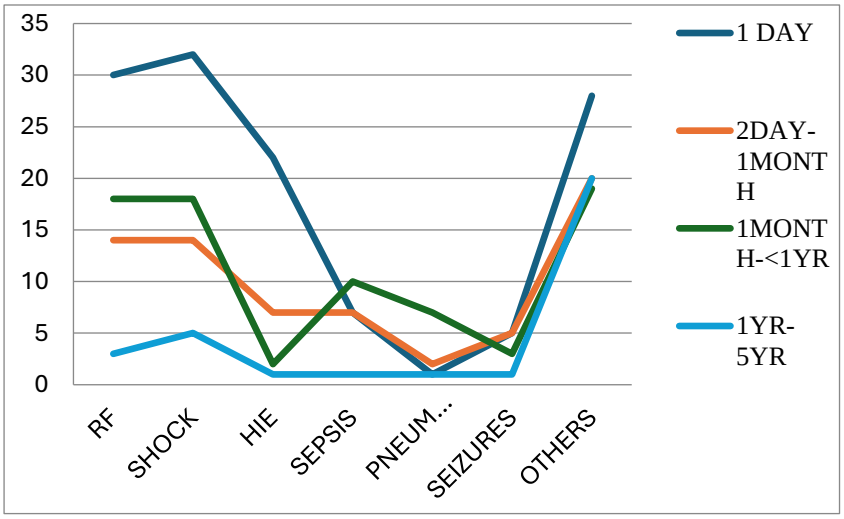

Fig 9.1 Graphical representation of correlation between child mortality age group and disease state

A linear correlation has been observed between the child age and disease state. A negative correlation has been obtained with the value of -0.3843. 95% confidence interval: -0.6625 to -0.01304. The coefficient of determination was 0.147. The two-tailed P value is 0.0435, considered significant.

10.CORRELATION BETWEEN MATERNAL AGE AND CHILD MORTALITY AGE

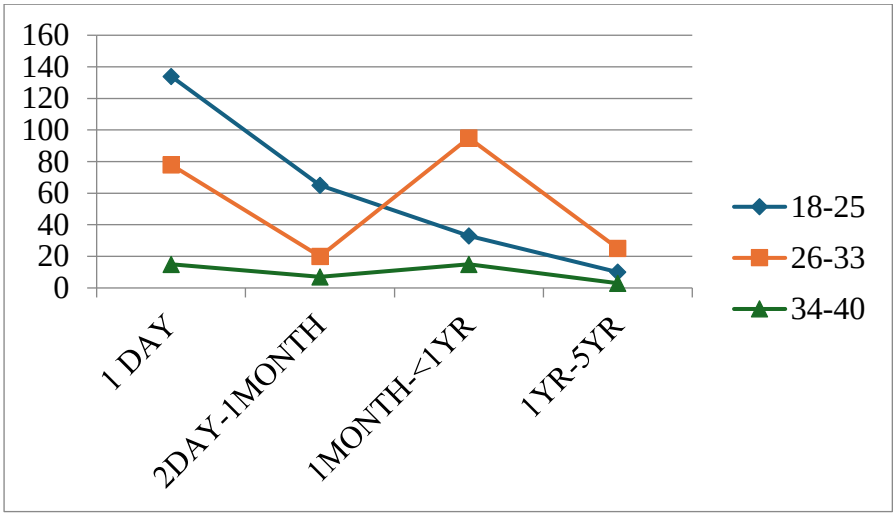

Fig 10.1 Graphical representation of correlation between maternal age and child mortality age

Correlation has been observed between maternal age and age of the child. A negative correlation has been observed with the value of -0.4271.95% confidence interval: -0.8040 to 0. 1947.Coefficient of determination (r squared) = 0.1824. The two-tailed P value is 0.1662, considered not significant.

MORBIDITY

1. AGE

AGE	NO Of CASES	PERCENTAGE
<1YEAR	306	44%
1 TO 2 YEARS	208	30%
2 TO 5 YEARS	186	27%

Fig 1.1 Tabular representation of child morbidity age

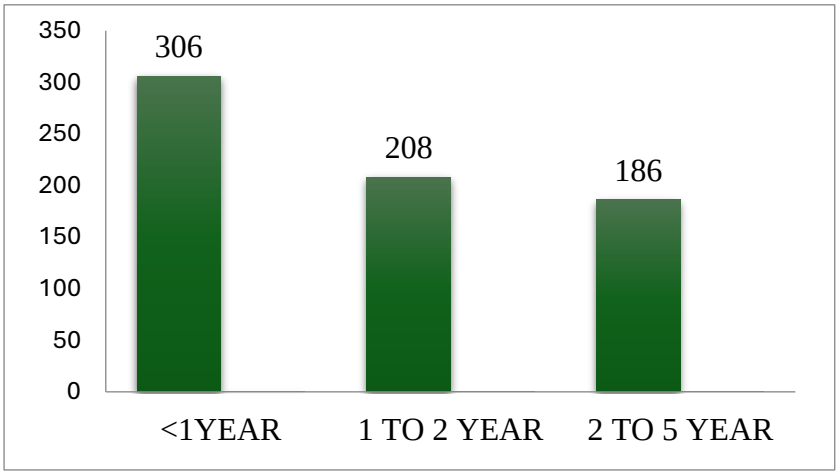

Fig 1.2 Graphical representation of child morbidity age

Among the age groups considered, totalling 700 samples of children under 5 five years old, there were 306 less than 1 year of age group, 208 children are between 1-2 years, and 186between 2 -5 years age group. The highest morbidity rate 44% of age less than 1 year, followed by 30% of age 1 to 2 years and the lowest age group with 27% between 2 to 5 years.

2. GENDER

GENDER	NO OF CASES	PERCENTAGE
Male	376	53.06%
Female	324	46.06%

Fig 2.1 Tabular representation of gender

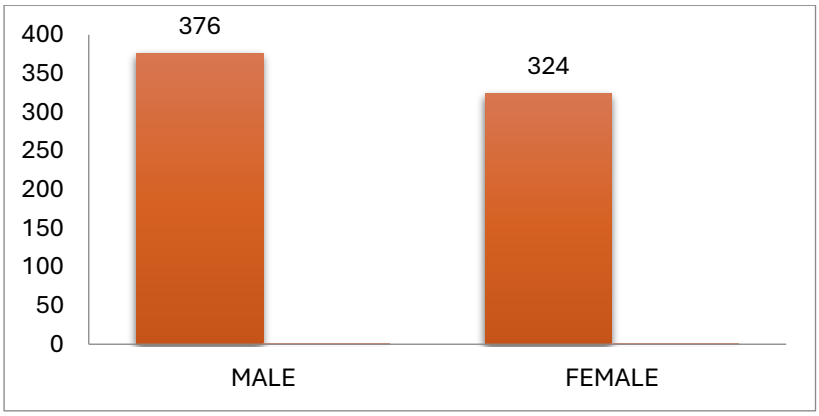

Fig 2.2 Graphical representation of gender

The morbidity study encompasses both male and female genders, with the total of 700 cases where male's morbidity rate is higher than female morbidity rate. Males with a 376(53.60%) out of 700 cases and females with the lower side 324(46.40%) cases.

3. RESIDENTIAL AREA

RESIDENTIAL AREA	NO.OF CASES	PERCENTAGE
Rural	497	71%
Urban	203	29%

Fig 3.1 Tabular representation of residential area

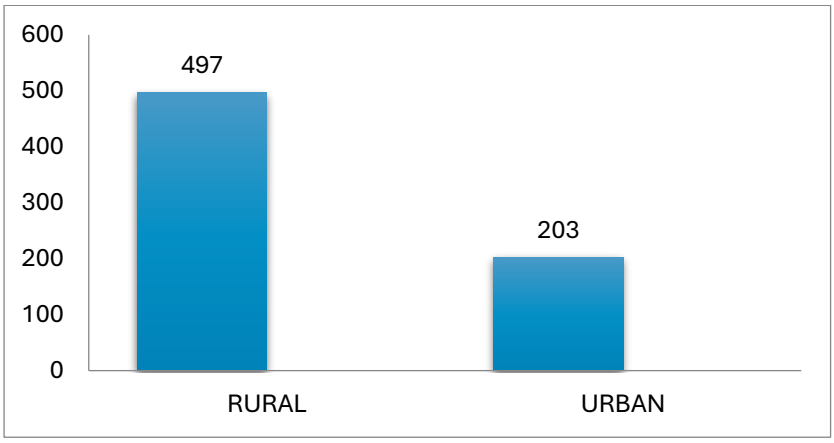

Fig 3.2 Graphical representation of residential area

Residence area marked to be a reason for the increase in the morbidity rate, where the total of 700 samples is taken under consideration. 497 samples are from rural which is highest with the 71% and the lowest 203 are from urban area which is 29%

4. INCOME

INCOME	**NO.OF CASES**	**PERCENTAGE**
<1.50L	455	65%
>1.50L	245	35%

Fig 4.1 Tabular representation of income

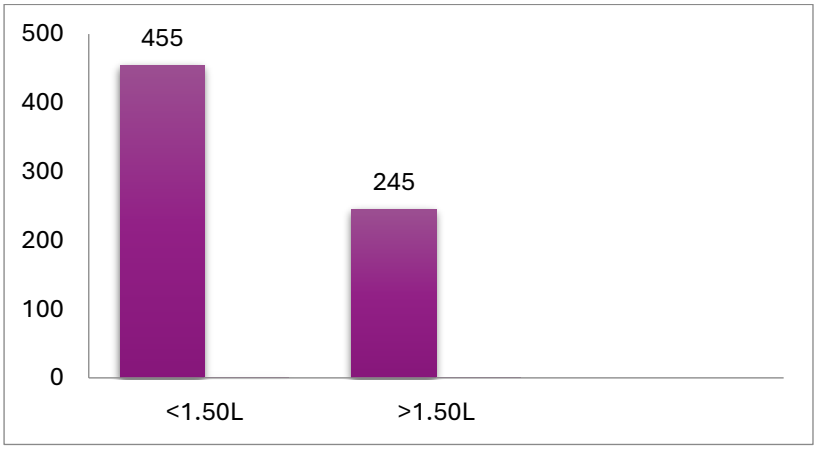

Fig 4.2 Graphical representation of income

Income typically contributes to an increase in the morbidity rate, for 700 samples there were 455 samples of less than 1.50lakh income with the highest percentage of 65. The lowest samples were observed in more than 1.50lakh income which is 245 samples (35%).

5.TYPE OF MARRIAGE

MARRIAGE	NO.OF CASES	PERCENTAGE
NCM	476	68%
1CM	119	17%
2 CM	50	7%
3CM	55	8%

Fig 5.1 Tabular representation of type of marriage

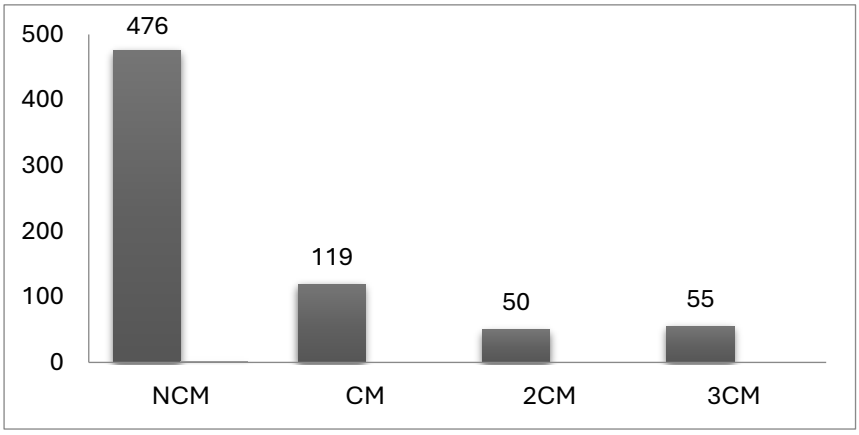

Fig 5.2 Graphical representation of marriage

Type of marriage results in birth complications, under this the morbidity rate get increased. Non consanguineous marriages (NCM) are of highest samples out of 700 samples with a 476(68%). Three types of consanguineous marriage they are primary, secondary, tertiary. Primary CM with 119 (17%), secondary CM with 50 (7%) and tertiary CM with 55(8%).

5. AGE- GENDER CORRELATION

	< 1 Year	1 To 2 Years	2 To 5 Years
Male	169	105	101
Female	140	99	85

Fig 6.1 Tabular representation of correlation between age and gender

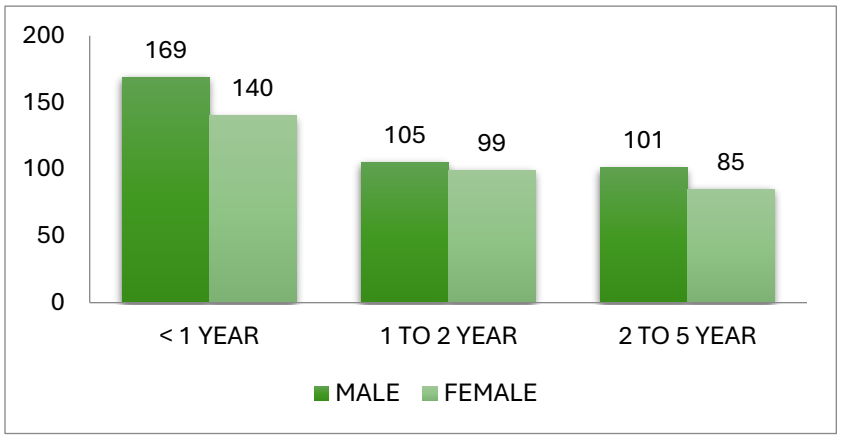

Fig 6.2 Graphical representation of correlation between age and gender

Age and gender correlated to determine the age group in which the disease affects a higher number of individuals. Males are more affected in all age groups compare with females. The highest number observed in the age group of less than 1 year, were males with 169 and females with 140. The lowest number males 101 and females with 85 in the age group of 2 to under 5. The correlation between age and gender are significant with the p value 0.0384.

7. AGE AND ANNUAL INCOME

	<1 Year	**1 To 2 Years**	**2 To 5 Years**
<1.5l	196	151	108
>1.50l	116	69	60

Fig 7.1 Tabular representation of correlation between age and annual income

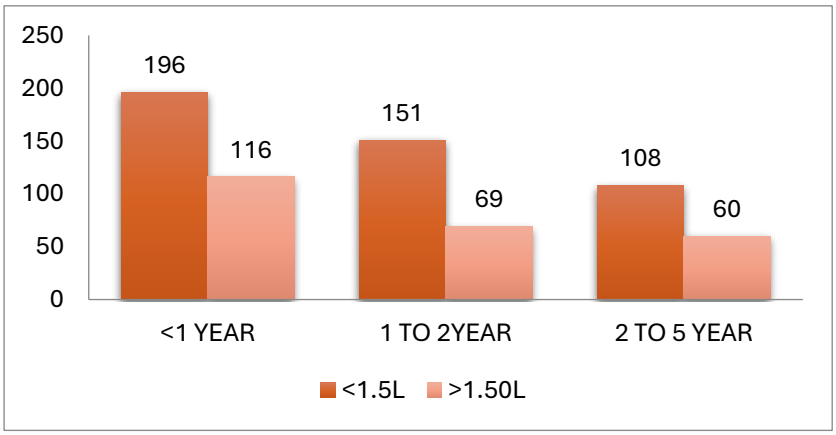

Fig 7.2 Graphical representation of correlation between age and annual income

By correlating with the annual income and age of under 5 years to find out the morbidity rate higher in below middle class. The higher number of morbidity observed in less than 1.50lakhs income in all age groups which is less than 1 year 196, 1 to 2 years 151 and 2 to under 5 years 108 are observed.

8. DISEASE - AGE CORRELATION

	1 year	**1 to 2 years**	**2 to 5 years**	**Percentage**
Bronchiolitis	38	27	24	12.60%
Seizures	30	29	29	12.60%
Broncho pneumonia	67	33	25	17.80%
Aspiration pneumonia	16	14	12	6%
Dengue	14	10	10	4.80%
Sepsis	16	11	11	5.40%
Meningitis	17	15	9	5.80%
Shock	12	7	8	4%
Acute GE	13	12	13	5.40%
Anaemia	14	13	11	5.40%
Thalassemia	14	11	8	4.60%
Others	55	26	25	15.60%

Fig 8.1 Tabular representation of correlation between disease and age

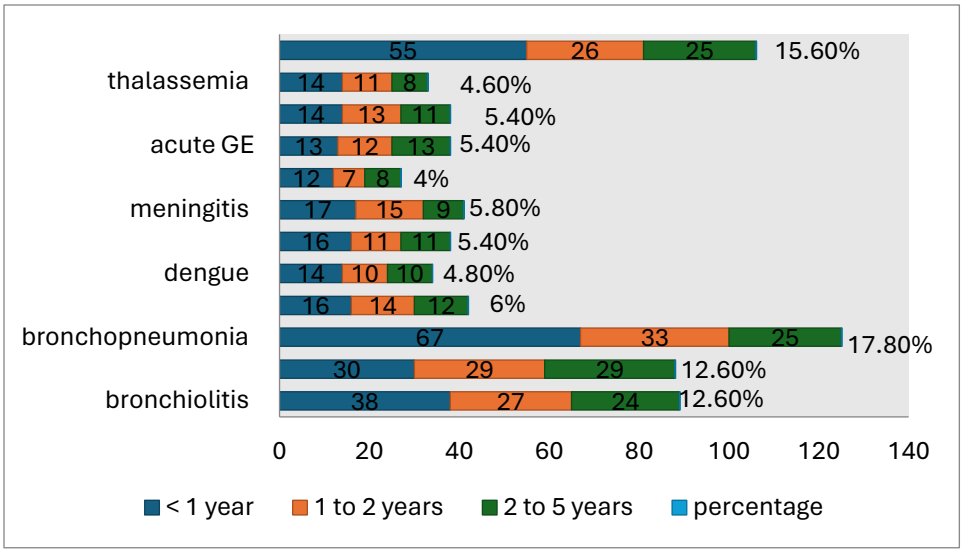

Fig 8.2 Graphical representation of correlation between disease and age

Age and disease state are correlated to find out at what age the more morbidity rate occurring and which disease percentage highest in all of them. Mostly less than 1 year of children are affecting with a disease, respiratory diseases are more in common. children are affecting with the respiratory diseases like bronchiolitis (12.60%), bronchopneumonia (17,8%), aspiration pneumonia (6%). The lowest disease condition observed was shock (4%). The other conditions were also observed with less in number like jaundice, renal failure, hepatitis, malaria, GDD. Age and diseases state are correlated with each other where the p value is <0.001 which is extremely significant.

DISCUSSION

Mortality is referred to number of deaths in a certain group of people in a certain period. Morbidity refers to having a disease or a symptom of disease within a population. Socioeconomic factors such as education and income affect disease incidence and outcomes through five broad groups of "proximal determinants" of child survival: maternal factors, nutrient deficiency, environmental contamination, injury and personal illness control characterized by the availability of health services and the capacity to use them.

In our study we included a sample size of 1000 cases of which 300 are mortality and 700 are morbidity conducted in retrospective style. The main aim of the study is to observe the disease state which has high prevalence to mortality and morbidity and role of clinical pharmacist in minimizing the paediatric complications.

We have considered children of age under five, which we have categorized into four groups. The groups are 1day (45%), 2day – 1 month (19%), >1month - <1 year (28%), >1year - <5years (8%).

For 1 million babies every year, their day of birth is also their day of death. More than a third of neonatal deaths take place on the day of birth, and close to 2 million newborns die in the first week of life.[29]

The collected sample has been grouped into males (61%) and females (39%). Males have shown more mortality when compared to females. In the present study we considered maternal age which is categorized into 18-25(86%), 26-33(7.1%), 34-40(7.8%). Among the grouped maternal ages, the age group of 18-25 have shown a higher percentage.

In the current study we sort out mode of delivery into two categories that is caesarean(37%) and normal vaginal delivery (63%).

Area of residence is categorized into rural(72%) which show greater mortality when compared to urban(28%).

Non consanguineous marriages [65%] shows higher mortality than primary consanguineous marriages [15%], secondary consanguineous marriages [8%] and tertiary consanguineous marriages [12%].

The disease state that is causing highest mortality according to our study is shock[22%], followed by respiratory failure[21%] among the other disease states which are sepsis[9%], respiratory distress[8%],pneumonia[5%],meningitis[5%],HIE[5%],seizures[4%], low birth weight[3%],congenital[1%] and others[17%]. Among the infants, sepsis/pneumonia, asphyxia, and prematurity/low birth weight (LBW) remain substantial causes of deaths.[10]

The co-morbid conditions seen in our study are respiratory failure with shock, HIE, sepsis, respiratory distress.Acute respiratory infections (ARIs) contribute to major disease associated mortality and morbidity among children under 5 years [8]

A linear correlation has been observed between the child age and disease state. A negative correlation has been obtained with the value of -0.3843. 95% confidence interval: -0.6625 to -0.01304. The coefficient of determination was 0.147. The two-tailed P value is 0.0435, considered significant.

A linear correlation has been observed between maternal age and age of the child. A negative correlation has been observed with the value of -0.4271.95% confidence interval: -0.8040 to 0. 1947.Coefficient of determination (r squared) = 0. 1824.The two-tailed P value is 0.1662, considered not significant.

The children of age <1year [44%] are more vulnerable to morbidity than children of age 1-2years [30%] and 2-U5[27%].

In our study males [53.6%] have shown more morbidity than females [46.4%].

Residents of rural area [71%] are more susceptible than urban area residents [29%]. Rural, tribal and difficult-to-reach areas of India are particularly lacking in health care facilities, and this has been recognized as one of the determinants of the high infant mortality and morbidity in this country. [5]

Morbidity is seen more in groups of people who have income of <1.50lakh [65%] while compared to >1.50lakh [35%].

Non consanguineous marriages [68%] has high morbidity than consanguineous marriages [17%], secondary consanguineous marriages [7%] and tertiary consanguineous marriages [8%].

Age of the children and gender are correlated, from which the results drawn are age of <1year have males [169] and females [140], 1-2years have males [105] and females [99] and 2-U5 have males [101] and females [85].

Disease state and age are correlated of which <1year are more effected with diseases. The diseases with high morbidity are bronchopneumonia [17.80%],broncholitis[12.60%], seizures [12.60%], while those are less occurred are shock [4%]. Respiratory distress is also the important cause of neonatal morbidity, and it causes not only varies from centre to centre but also depends on the place of delivery.

CONCLUSION: -

The study reveals crucial demographic correlations with mortality and morbidity rates, guiding precise interventions for better healthcare outcomes. This understanding drives targeted strategies to reduce both mortality and morbidity effectively.

Significant correlations have been discovered, revealing that age, disease state, and mortality rates are strongly linked, with p-values below 0.0435 indicating a higher risk of mortality within a single day, particularly among older individuals. Conversely, morbidity disproportionately affects infants under one year old, especially males from rural or lower-income backgrounds. The correlation between age, disease state, and morbidity is exceptionally strong, with p-values lower than 0.0001, indicating a higher prevalence of the disease among younger age groups. Moreover, gender plays a notable role, with males in younger age groups being more affected than females, as suggested by p-values below 0.0384.

Clinical pharmacists are integral in reducing mortality and morbidity rates by actively engaging in healthcare teams to ensure safe and effective medication use, specialized dosing, and monitoring. They collaborate closely with pediatricians and other healthcare providers to optimize medication therapies and prevent adverse drug events, while also ensuring adherence to treatment protocols.

Moreover, through maternal education, counselling, awareness, and outreach programs, they further enhance their impact. These initiatives provide caregivers, particularly mothers, with vital knowledge about childhood diseases and preventive measures. By educating mothers about vaccination schedules and hygiene practices, they empower them to protect their children against infectious diseases. Together, these efforts contribute significantly to improving healthcare outcomes for children.

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CONFLICTS OF INTREST

NIL

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