Risk Factors for Autism Spectrum Disorder

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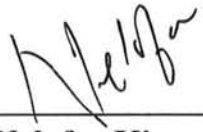

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CERTIFICATE

It is certified that M.Sc. Research report on "Risk Factors for Autism" prepared by Shabana Hussain has been approved for submission to National Institute of Psychology, Quaid-i-Azam University Islamabad.

Nelofer Kiran Rauf

(Supervisor)

Dedicated to

To all those near, dear and loved ones who made it happen!

With utmost regard and gratitude

...Especially my loving parents and

My supervisor

Risk Factors for Autism Spectrum Disorder

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LIST OF ABBREVIATIONS

ASD	Autism Spectrum Disorder
E-S	Empathizing- Systemizing
HPA	Hypothalamic Pituitary Adrenal
MCs	Maternal Metabolic Conditions
IH	Industrial Hygienist
CHARGE	Childhood Autism Risk from Genetics and the Environment
GARS2	Gilliam Autism Rating Scale-Second Edition

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Shabana Hussain

ABSTRACT

Present study aimed at identifying the risk factors related Autism Spectrum Disorder. The risk factors included are medical, developmental, prenatal and family related risk factors. Employing the technique of non-probability purposive sampling data was collected from (*N = 60)* mother of children with autism Spectrum Disorder from Rawalpindi and Islamabad. Risk factors checklist was used to assess Risk factors for Autism, Gilliam Autism Rating Scale-Second Edition (GARS-2). was used to screen children with autism Spectrum Disorder. Risk factors checklist was developed through literature review and interview from experts. The risk factors included are medical, developmental, prenatal and family related risk factors. Results indicate medical risk factors included that 38.3 % of the mothers reported that their children were suffered from jaundice, influenza, lack of oxygen (at the time of birth). Developmental risk factors included that 56.7 % of the children were delayed in following activities (Crawl, sit, stand, speech, walk, feed self and dress self). Prenatal risk factors included that 91.7 % experienced stress during pregnancy. As reported by mothers 85 % of the mothers and fathers are cousin to each other. It was found that mothers who have children with autism experienced adverse situations during their pregnancy i.e. 46.7 % experienced fever during pregnancy, 86.7 % suffered from viral illness (cold, influenza, measles, mumps, rubella and seizures), 86.7 % reported that they had diabetes and 93.3 % experienced high blood pressure during pregnancy. Moreover, most of the mothers (78.3%) were exposure to pesticides during pregnancy. In Family related risk factors 18 % mothers reported that they had history of emotional problems and Schizophrenia in their family. This research will help to create awareness among people that there are certain medical, developmental, prenatal and family related risk factors that cause Autism Spectrum Disorder. By avoiding few environmental hazards, we can prevent Autism Spectrum Disorder.

INTRODUCTION

Chapter 1

INTRODUCTION

Autism Spectrum Disorder is a neurodevelopmental disorder. It a situation seen as a certain degree of reduced social behavior, interchanging messages or information between two or more people, and a partial range of interests and actions sole to a person is often referred to Autism Spectrum Disorder. Autism initiate in infant and tend to endure hooked on adolescents and adulthood. Mostly the situations are apparent in the first 5 years of life. It is called a "spectrum "illness or disorder because the type and severity of symptoms experienced by people varies widely. Across all ethnic, racial and economic groups, Autism Spectrum Disorder (ASD) occurs (World Health Organization, 2017). Unfortunately, its prevalence is increasing day by day around the world (Fombonne, 2009). In Pakistan, 350,000 children suffered from autism and this estimate is rising day to day (Fazil & Sulman, 2014). But it's cause are still unknown. Few researches highlight the risk factors associated with Autism Spectrum Disorder. Keeping in view the scarceness in research related to risk factors of ASD, present study aimed at investigating the risk factors including medical, developmental, prenatal and family related risk factors.

Autism 's etiology is unknown. Although the estimated concordance rate of 60 to 92 % in monozygotic twins compared to 0 to 10 % in dizygotic twins highlights the standing hereditary influences, also indicate the role of environmental factors in the incomplete concordance of monozygotic twins. The mechanism underlying autism etiology is now believed to be a polygenic and potentially epistatic factors that can most probable interact with genetic factors in order to increase the risk. While the typical neuropathology remains vague, there have been macroscopic, microscopic and functional brain abnormalities demonstrated in studies. These different brain abnormalities suggest that the etiologically relevent period may be in utero or possibly in early infancy. Its emphasis on the importance of epidemiological study on most likely danger aspects for autism was obstetric and delivery, as well as neonatal experiences. While numerous researches backing the theory that obstetric and neonatal difficulties could rise the danger of autism, the exact difficulties, effect magnitude and overall conclusions of these researches were inconsistent. These

contradictions may affect from methodological changes including comparison group, sample size and methods for assessing exposure. (Gardener & Spiegelman, 2011).

Symptoms According to DSM 5

Persistent shortcomings in social communication and social interaction in several circumstances, as shown in the given lines:

Deficits in social-emotional reciprocity, such as abnormal social approaches and an unsuccessful attempt to a normal back-and-forth conversation; sharing any of their interests, feelings or effects; failure to initiate social interactions or to answer to them. Discrepancies in non-verbal communicative behaviors used for social communication, such as badly joined oral and non-verbal communication, irregularities in eye interaction and body language, or deficiencies in the getting the practice of signs or gestures: Complete absence of facial expressions and non-verbal communication.

Defect in the development, maintenance and knowing of relationships, such as problems in adapting behavior to different social circumstances; problems in sharing creative play or creating new friends; lack of curiosity in peers. Restricted, repetitive patterns of behavior, interests or actions, as shown by as a minimum two of the succeeding, present or historical patterns. Stereotypical or repetitive patterns of behavior, usage of items or speech (e.g. simple motor stereotypes, spinning objects, echolalia, idiosyncratic phrases). Persistence on sameness, inflexible adherence to daily activities, or ritualized patterns of oral or non-verbal behavior (e.g. extreme distress at minor changes, transitional complications, inflexible rational patterns, welcoming formalities, must yield the identical way every day or like to have the same food again and again).

Extremely limited, fixed goals that are irregular in strength or motivation (e.g. strong attachment to unusual objects or concern for them, overly limited or persevering interest). Hyper-or hypo-reactivity auditory insight or uncommon general interest in sensory aspects of the environment (e.g. seeming pain / temperature irrelevance, adverse response to ambient noises or visuals, odor or smell of items, visual preoccupation with bright light or crusade). Symptoms must be existing at an initial stage of development (but they cannot be fully manifested until social demand exceeds limited capacity or can be masked in later life by learned strategies).

Symptoms in social, professional or other significant areas of present working cause clinically substantial damage.

Such turbulences are not well clarified by intellectual disability or global delay in development. Intellectual disability and ASD often happen together; social communication must be lower than anticipated at the over-all level of development to make comorbid identifies of ASD and intellectual infirmity.

Major Areas Affected in Autism Spectrum Disorder

Social communication. Adolescent or a grown-up individual with ASD might have social interaction and communication, interaction problems, comprising any of the following symbols, according to Wetherby et al. (2004):

Does not reply to his or her name or sometimes does not seem to perceive you. Struggles cuddling and holding and appears to play lonely and to retreat into his own world. Consumes deprived eye interaction and no facial expression. Doesn't seems to express or has delayed speech or misplaces previous ability to say words or sentences. Can't flinch a conversation or retain one going, or only starts one to make needs or tag items to identify it. Expresses with an irregular manner or beat and might practice a sing song expression or robot-like talking. Repeat words or expressions exact, nonetheless, doesn't comprehend in what way to practice these. Doesn't seem to comprehend modest queries or instructions. Doesn't prompt feelings or moods and seems unmindful of others' approaches.

Many researches have been carried out on children with autism's impaired play and language skills. Vicky Lewis (2003) conducted a re-analysis of various studies focusing on the relationship between playing and language in the normal population and research on the autistic population. He found that play and language skills are typically related to the development of children and development appears first in the play and then in the language. This relationship is not clear in autistic children. The author concludes that this relationship exists in autistic children, but there is a very large time gap between the emergence of play skills and language skills. He also suggests that a third factor mediates the relationship, most likely the way parents interact with their children during episodes of play.

Communication and linguistic difficulties are the first to identify and are a major cause of concern for parents, according to Gray (1994). Verbal and

communication dificits were the main cause of strain parents and one of the causes for their offspring's looking for remedial assistance. Few kids with Autism Spectrum Disorder remain silent throughout their whole life. Few toddlers who subsequently show Autism signs hubbub throughout the first few months of lifespan, but soon cease this expression of development.

Social interaction. A passive, aggressive or disruptive approach to social interaction is inappropriate. Does not point to objects that share interest or bring them intakes trouble identifying nonverbal indications or gestures, such as understanding the facial languages of other people, body stances or voice attitude.

Perry and Condillac (2003) reported that a distinctive emerging child generally looks at individuals, can turn to noises, beam socially and grab a finger. Autistic offspring, however, find it difficult to learn to involve in, give and take on human communication every day. In the first few months of life, eye contact is not established, social interaction is avoided, other people seem indifferent and often prefer to be alone. They might refuse to accept attention or accept hugs passively. In addition, they barely ever look for ease or typically react to anger or affection displayed by parents. They are close to their parents; however, it is bizarre and hard to interpret the expression of attachment. They may be unable to understand the actions of others. They find it difficult to regulate their emotions in some cases, and this can take the form of immature behavior for example crying in a class.

Patterns of behavior. Children or adults with ASD may have partial, repeated behavioral patterns, interests or actions, including any of these symbols:

Does repetitive actions, such as shaking, turning or hand fretting. Carries out actions that can make self-damage, for example biting or headbanging. Winds up exasperates at the smallest change and develops specific routines or rituals. Has coordination problems or strange movement patterns, for example torpedoing or rambling on the toes, and has strange, rigid or overstated body language. Stands captivated by object details, such as the rotating wheels of a toy car, however, does not comprehend the object's overall purpose or function. Remains remarkably subtle to light, noise or touch, nonetheless might not be sensitive to discomfort or illness. Doesn't play imitations or do-believes. Fixes with an abnormal strength or focus on an

object or activity. Takes precise food likings, for example taking only a limited nourishment or refusing nourishments with a certain taste (Wetherby et al., 2004).

Persons with autism also display stereotyped movements for example back and forth rocking, etc. They learn when they grow older, but when they happen, it is a sign of distress and anxiety (Charman, Howlin, Berry, & Prince, 2004).

Most children with ASD seem usual physically. They typically have decent muscle control, but repetitive body actions incline to distinguish them from other typical children in development. These actions may be cut off and overlooked. Instead of using them for imaginative play, they spend hours lining their cars and toys in a way. The child can be really upset if someone moves one of the toys. A small modification in any mealtime calendar, dressing, bathing, going to school at some point and along the same route can be tremendously disturbing. Few kids keep dithering their arms or rambling on their toes for a lot of time. In their surroundings, they usually demand complete uniformity.

One of the indications of the disorder may be continued interest in frequent environmental movements. This includes the opening and closing of doors or daily item rotations, such as toys, etc. (Ruaf, 2017).

Next section highlights the theoretical perspective about autism and explanatory theories on Autism Spectrum Disorder.

Theoretical Perspective About Autism Spectrum Disorder

The earliest theories about autism were psychological in nature:

Psychological theories.

Bruno Bettelheim (1967). Bruno recommended that offspring with autism show the same apathy and hopelessness that was found in the prisoners of the German concentration camps throughout the World War II. He assumed that the child rejected parents and could perceive their negative feelings. He comes to believe he can't change the parent's reactions to him, whatever he does. His believes that his actions will also have no effect on the world. He then builds an empty autism fortress to

protect himself against pain and disappointment. "The Empty Fortress, "printed in 1967, he said that "the parent's wish that his child should not exist is the precipitating factor in child autism "(Bettelhiem, 1967, p. 125). In 1990, Bruno committed suicide. After his death, he was accused of antisemitism, plagiarism and manufacturing by many people. His theory was not empirically supported.

Charles Bohris Ferster (1961). Ferster (1961) thought that "infantile autism "was a form of childhood schizophrenia, as it used to be known. He was a behaviorist and suggested that the parent does not strengthen the early social behavior of autistic children. For example, when the child asks for a cookie and receives no response, he is deprived of strengthening his vocal behavior. He says there are two ways to eliminate a behavior, either by intermittent strengthening or extinction. The parent sometimes listens to the child in intermittent reinforcement and sometimes does not. When the parent responds, it is not the result of the child's behavior, but other variables affect the parent, e.g. the parent has been busy before, but is free now. In extinction, the parent does not react to the behavior of the child. The child perceives that his communicative and social behavior does not affect the environment and eventually drops such behaviors from his repertoire of behavior.

As Bruno's theory, no empirical support has been given to this theory. Although these two theories received no empirical support at all, they placed an enormous emotional burden on autistic children's parents. Autism is not now known to be caused by bad parenting.

Explanatory theories on Autism Spectrum Disorder. The greatest widely recognized models are:

Theory of mind. Simon Baron-Cohen, Alan Leslie and Uta Frith created the theory of mind trendy 1985 then is an illustrative model of the initial indication measures of the DSM-5 and attempts to clarify the obstinate shortfalls in message transferring among the individuals and social communication in different situations with individuals having ASD. The mind theory is the ability of neuro characteristic individuals (individuals without seeming psychological illness) to characterize other people's psychological states. During the first stages of child development, this ability appears innately and is recognized at about 4-5 years longstanding.

Persons by ASD have this ability lessened (near various notches of impact), that is why they cannot impute beliefs to others and predict their behaviour. Therefore, it must be worked on to toughen it. This psychological skill was not lone about expecting behavior in relations of purposes (considering what they reflect and/or need additional one to do), but similarly about deeper psychological states: discerning, considering, expressing, fantasizing, double-dealing, etc. By this aptitude, the individuals around us can clarify and expect the public behavior of others (Baron-Leslie & Frith, 1985).

Theory of executive dysfunction. Theory of executive dysfunction was shaped by Pennington and Ozonoff, 1996; Russell, 1997, and others; it is the descriptive model of the additional symptom criteria (B) of the DSM-5 and attempts to clarify the restricted and marked patterns of conduct, interests and exercises of individuals with ASD

Executive functions are a psychological aptitude implemented by independent activities. These innate skills enable us to organize in such ways, to remain supple, to expect, to plot, to set objectives and goals, and at the same time learning how to rheostat our own desires.

Other than these, there stand a collection of cognitive progressions that behaves in new circumstances where we don't have a former react idea. They are in the prefrontal cortex. The prefrontal cortex is the cerebral cortex covering the front part of the frontal lobe. That is the latter developed portion of the brain, between 12 months and 18 ages, with two prominent points at the age of 4 and 18 (Pennington & Ozonoff, 1996).

The theory of weak central coherence. The concept of Weak Central Coherence in 1989 was created by Uta Frith; Joliffe and Baron-Cohen in the 90s, and it discusses in what way difficult it is for people with ASD to include evidence in a sole lucid "everything "and focus devotion on a minor fact. Weak Central Coherence Theory

These two categories are as following:

- Perceptual: Perceptual means that individuals with ASD prefer to process confined info before universal or global info. For example, it was often

identified, that individuals having ASD concentrates mainly on explicit image or goal facts as compared to view it as a whole.

- Conceptual: individuals which are having ASD will more egger to have an unsuccessful effort of processing the contextual sense and prior awareness. Often, these individuals will not know or identifies the circumstances or situations, that they have previously gone through (Jolliffe, & Baron-Cohen, 1999).

The theory of empathising-systemising. Simon Baron-Cohen created the theory of Empathizing-Systemizing (e-s) they somewhere in 2009 attempts to enlighten individuals having the ASD 's difficulties in communication and social dealings.

It is hypothesized that there exist a gloom of understanding and systematization, i.e. the author argues that there are disproportionately empathic wits (with an extreme ability to have position one individual on the other way, nonetheless with a little ability to systematize) with unreasonably methodical brains, i.e. with little empathy). Individuals having ASD are more use to be nearer to the methodical exciting individuals, those with little more dose of extra aggression with them and show hypo-bustle in nearly entire empathy circuit brain areas.

Individuals having ASD can grow "cognitive compassion, "a cultured empathy, through learning. However, as in neurotypical people, it will never be intuitive or primitive. There exists a more sentimental empathy, which is actually the responsive component of cognitive sympathy, i.e. just to check whether an sensitive response ties another person's judgments and moods. Individuals which are having a systematize appearance for system guidelines to envisage in what way they grow, deploy a changeable, adapt a completely new and unused arrangement or originate a complete innovative system. So, for these, individuals having ASD prefer more of a curiosity in assortment systems (kinds of fossils), machine-driven systems (operating a radio), arithmetical systems (InterCity timetables, charts), intangible systems (song), ordinary systems (climatology), communal systems (behavior with a party friends) and motor-powered systems .They are moreover characterized by the search and creation of designs in "non-systematic "possessions to find a stable places for themselves in a situation that is particularly unsafe. A solid systematic propensity

can explicate the worries in the generalization of individuals having ASD (Baron-Cohen, 2009).

Prevalence of Autism Spectrum Disorder

According to Rau (2003), Swiss psychiatrist Eugen Bleuler first used the term "autism "in 1911. It is derived from the Greek word autos, which means "self "and ismos, which means "condition "(as quoted in Hansen, 2006). Bleuler used the term to describe the idea of "turning one's self inward. " He used it to describe adult schizophrenia patients. In 1943, a psychiatrist at Harvard named Leo Kanner identified the current Autism Spectrum Disorder. He noted 11 disturbed kids whose symptoms seemed to be neither mental retardation nor schizophrenia. He called the syndrome "early childhood autism. " He gives a detailed report of two of these cases in a paper he wrote in 1943. Symptoms include absence of interest in people and unnatural interest in objects, lack of emotional reciprocity, obsessive tendencies, ritualistic or repetitive behavior, insistence on sameness and communication deficiencies. This collection of symptoms is now called "Autism "or "Autism Spectrum Disorder. "

About 1 in 160 children worldwide have an autism spectrum disorder. Some studies that are significantly high have been completed. Studies carried out over the last 50 years have increased the prevalence of autism worldwide (Fombonne, 2003). Over the past 40 years, the prevalence of autism, a disease characterized by impairments in social interaction and communication, has grown roughly tenfold (Cohen et al 2004).

Autism is a complex developmental disability that usually happens in the first three years of life. It has been estimated that the result of a neurological disorder affecting the functioning of the brain, autism and its associated behaviors occurs in as many as 1 in 500 limits. Autism is four times more common in boys than girls and does not know racial, ethnic or social boundaries. Family income, lifestyle and education do not affect the likelihood of autism (Fazil & Sulman, 2014).

Autism prevalence was estimated at 13 / 10 000 and is expected to increase. (Fombonne, 2009).

In Pakistan, 350,000 children suffered from autism and this estimate is rising day-to-day (Fazil & Sulman, 2014).

Autism is a disorder of neurodevelopment. In boys, it is diagnosed four times as often as girls. Researchers have paid much attention to it, but it is an intricate phenomenon and still not very well recognized. Current epidemiological researchers have identified a growth in incidence of autism during the last decade (Tidmarsh & Volkmar, 2003).

Risk Factors of Autism Spectrum Disorder

The precise reason of ASD is unknown currently. Because of the disorder 's complication and the detail that signs and harshness differ, heredities and the situation might play a role in numerous causes. Genetic research is assured that genetic research identifies a specific genetic marker for these disorders. As twin studies show, autism is more likely to develop siblings of children with autism compared to general population or related disorders (Bailey et al., 1995).

It is a neurodevelopmental disorder considered by communication and social behavior impairments and repetitive behavior. However hereditary aspects may be mainly answerable for the existence of autism, they cannot completely the reasons for all cases and, furthermore a very specific grouping of autism-connected DNAs, precise ecological features could be considered as a menace aspect for the growth of autism. The inclusion of ecological aspects in autism is consequently a significant expanse of study, and this review later discuss recent data (Grabrucker, 2013). Risk factors identified through literature review includes medical, developmental, prenatal and family related risk factors Zerbo et al., 2012; Schmidt, Hansen and Hertz-Picciottom, 2011).

Environmental and Medical Risk Factors

Researchers investigate whether aspects for example virus-related contagions, pregnancy medications, pregnancy difficulties or air impurities play a part in (ASD) Zerbo et al., 2012; Schmidt, Hansen and Hertz-Picciottom, 2011).

Prenatal viral infection. Maternal infection, self-immune illness or allergy may change the resistant standing of the fetal mind and the fetal immune system particularly (Anderson et al., 2007; Libbey et al., 2005; Miller et al., 2005; Patterson 2009; Pardo et al., 2005; Arndt et al., 2005; Blattner, 1974; Meyer et al., 2007; Fox et al., 2012).

Zinc deficiency. In autistic children, a great occurrence of zinc shortage is perceived. Deficiency in parental / early progressive zinc could stipulate a gene / environmental interaction process (Yasuda et al., 2011; Faber et al., 2009; Jen & Yan, 2010; Walsh et al., 2002; Golub et al., 1995; Sandstead et al., 1978; Lakshmi Priya & Geetha, 2011).

Abnormal melatonin synthesis. Genetic abnormalities or environmental aspects can affect the fusion of melatonin. Melatonin controls the daily beat, is an antioxidant, resistant rejoinder and synaptic malleability (Feng et al., 2012; Cortesi et al., 2010; Melke et al., 2008; Rossignol & Frye, 2011).

Maternal diabetes. Overweightness and diabetes are more common in ASD mothers. Diabetes during pregnancy in the mother leads to double the risk (Krakowiak et al., 2012; Gardener et al., 2009).

Prenatal and perinatal stress. The association of autism with prenatal stress has been reported. In animals, prenatal stress triggered the HPA axis, irrespective of the specific prenatal stressor used, resulting in post-delivery immune purpose abnormalities (Limperopoulos et al., 2007; Kinney et al., 2008; Ward, 1990; Beversdorf et al.,2005).

Toxins. In children prenatally exposed toward valproic acid or thalidomide, the incidence of autism is expressively advanced. Organophosphate and organochlorine insecticides can subsidize to autism and psychiatric medicines occupied during pregnancy by the female parent. (Stromland et al., 1994; Karr et al., 2007; Gardener et al., 2009; Kumar & Chhibber, 2011; Kumar et al., 2010; Kolozsi et al., 2009; Dufault et al., 2012; Roberts et al., 2007; Szpir, 2006; Moore et al., 2000).

Parental age. The danger of developing autism in either parent is associated with advanced age. Although most mutations accumulate in the paternal germline, advanced maternal age can contribute to increased complications of pregnancy and maternal autoimmunity (Reichenberg et al., 2010; Sandin et al., 2012; Parner et al., 2012; Shelton et al., 2010; Kong et al., 2012; Van Balkom et al., 2012; Buizer-Voskamp et al., 2011; Grether et al., 2009; Croen et al., 2007; Gardener et al., 2009).

Genetic Factors

The ASD seems to involve different genes. Autism can be linked to a genetic disorder in some children, such as fragile syndrome. Genetic mutations can increase the risk of autism spectrum disorder for other children. And many other genes can affect the development of the brain. Some genetic changes appear to be inherited, while others instinctively occur. (Melke et al., 2008; Cortesi et al., 2010; Rossignol & Frye, 2011). Evidence from different studies has now confirmed a strong genetic basis for autism spectrum disorder. The risk of ASD in autistic children 's siblings is about 75 times higher than in autistic children 's siblings (McBride, Anderson, & Shapiro, 1996). In a British twin sample study, 60 percent of monozygotic twins were concordant with autism compared to no dizygotic pairs. In addition, 92 percent of monozygotic twins corresponded to cognitive or social anomalies compared to 10 percent of dizygotic twins (Bailey et al., 1995). The results show that autism spectrum disorder is under high genetic control.

Pakistani Perceptions Towards Autism Spectrum Disorder

Opinions exist at the cultural level as well as in people's minds. On the very low level, family members largely effect the life of a child through their beliefs about the cause of a disability, their ideas about the value of a disabled person and their acceptance of a disabled person (Groce & Zola 1993). The views of families affect the participation of the children in social activities, the possessions they spend on the child and their potentials of what their child can accomplish in adulthood later on. Families ' disability views are not only specific to these parents, but they stem from society's overall views and standards, comprising economic, political, social and spiritual macro-elements.

In the treatments they seek for their child, parents ' views about the causes of their child's disability play a role. For example, families in Pakistan who believed that the disability like autism of their child was due to "the will of Allah "were more likely to regard the condition of their child as fixed and thought that they should only take care of their child in the most elementary sense, for which Allah Almighty would recompence them (Ravindran, & Myers, 2012).

Autism in Pakistan is diagnosed and treated in numerous settings and is provided by a variety of health professionals. Unfortunately, Pakistani healthcare

professionals have little knowledge and awareness of autism, and thus the existence of imprecise and old-fashioned theories about this syndrome can jeopardize primary recognition and prompt transfer of mediations. Current specialists in the turf in Pakistan have an instable knowledge of autism due to the occurrence of numerous misapprehensions about several important characteristics of autism, with progressive, cognitive and emotional physiognomies (Imran et al. 2011).

Inappropriately, there was a lack of awareness and knowledge about autism in our population. And also, they do not know the methods of diagnosis and treatment (Anwar, Tahir, Nusrat, & Khan, 2018).

Literature Review

Krakowiak et al., (2012) passed out his research to examine whether autism spectrum disorder (ASD) and developmental delays are associated with metabolic conditions (MCs) during pregnancy (diabetes, hypertension and obesity). Maternal metabolic conditions during pregnancy (diabetes, hypertension and obesity) can be generally associated with the risk of autism and other problems in children with neurodevelopment. In study, children between the ages of 2 and 5 were selected and lived with biological parents. Information on maternal conditions was obtained from medical records or from a structured interview with the mother. Compared to controls, mother has maternal metabolic conditions. Compared to controls, all maternal metabolic conditions were more prevalent in case mothers. These conditions were collectively linked to a higher ASD feasibility compared to controls. MCs were collectively associated with impairments in visual reception, motor skills, receptive and expressive language and adaptive communication and socialization in this study.

Zerbo et al., (2012) directed a study to determine the contributions related with autism or developmental delays "maternal influenza or fever during pregnancy. " Maternal influenza is not related with autism spectrum disorder or developmental delays, but both ASD and developmental delays were associated with pregnancy fever. Medication for maternal anti-fever explains the link between fever and ASD. Children between 2 and 5 years of age whose mothers are ready to participate between January 2003 and September 2010 have been included in the analysis. Participants are sampled from three strata: children with autism, children with delayed development, but not autism, and children from the general population. Trained

clinicians carried out standardized clinical assessments to confirm diagnostic criteria. Exposure data gathered by telephone interview with the mother concerning the child's periconceptional, prenatal and early childhood exposures and experiences. Demographically, there were no differences between the typically developed mother of children and the autistic mothers of children. For the analysis of the relationship between fever and ASD, the likelihood that mothers of children with ASD reported fever during pregnancy is higher than mothers of children who usually develop. This study found that fever mothers of children with ASD describe the receipt of influenza vaccine compared to typically controlled mothers. This result should be taken into account with vigilance because the exact timing of influenza vaccination has not been announced. In order to fully investigate the effect of influenza vaccine on the risk of autism, further research should be carried out on this result. And it remained to be explained the effects of viruses on the developing fetus. In animal experiments, the descendants of dams infected with human influenza viruses during pregnancy showed autistic behavior (Patterson, 2002), which indicated the possibility of a relationship between influenza infection and the risk of human autism.

McCanlies et al., (2012) researched Parental Exposure and Autism Spectrum Disorder. Parental professional information was used in this research, both self-report and industrial hygienist (IH). Data from self-reporting collected during a structured interview and the second qualitatively estimated through an experienced panel of three based on a job history. In this study, 174 families were selected for 93 children with autism and 81 children without autism. Results showed that exposure to certain chemicals in the workplace may be important in the cause of ASD, exposure to lacquers, varnished and xylene was more common in parents of children with autism spectrum disorder compared to parents of children who were not affected. Parents of children with autism reported exposure to asphalt and solvents more generally than parents of children who were not affected. Animal and human research shows that the fetus is more sensitive than an adult to the size and speed with which cellular structures grow during development (Grandjean & Landrigan 2006; Perera et al. 1999). The limitation of this study is small sample size and research also describes the sensitivity of IH data as highly inconsistent, since they focused only on certain specific chemicals rather than broad classes of chemicals, but the results indicate that

exposure to certain chemicals in the workplace can be associated with autism etiology and warrant further investigation.

Schmidt et al. (2011) carried out a case-control study based on papulation in order to determine the association between the intake of autism and maternal vitamin supplements in preconception periods and the effects of interaction with functional genetic variants involved in a carbon metabolism. Results showed that intake of maternal vitamins before and during pregnancy may reduce the risk of children with autism, especially for mothers and children who are genetically susceptible. There was no suggestion of a relationship with maternal nutritional factors and their interactions with gene variants. In comparison with typically developing children, mothers of children with autism are less likely to take prenatal vitamins during the three months before pregnancy. In order to confirm the diagnostic criteria, children aged 24-60 months were selected for study and standardized clinical evaluations were used. Controls of the general population were examined from files of state birth. Data collected by telephone interview with mothers were asked if they consumed prenatal vitamins, multivitamins, selected nutrient-specific vitamins, cereals and other supplements at any time during the three-month period before pregnancy and breast-feeding. Limitation of this study, which requested the reporting of vitamin and supplement information after the developmental status of the child was already known, to recall a period several years before the interview created recall bias problems. In addition, the study did not collect complete pregnancy dietary information to prevent nutrient intake assessment.

Siddiqui, Elwell & Johnson (2016) carried out a study to investigate the relationship between mitochondrial dysfunction and autism spectrum disorder. Evidence currently suggests that a significant number of people with autism have associated diseases such as mitochondrial diseases and energy generation irregularities. This evidence therefore led to the hypothesis that mitochondrial dysfunctions can be associated with autism. Findings suggest that children with autism are more likely to have mitochondrial dysfunctions (reduced mitochondrial gene expression, reduced electron transport chain activity and gene generation irregularity). The studies, however, have small sample sizes. In addition, the techniques used in many of the studies differ. Therefore, the idea of a link between mitochondrial dysfunction and autism spectrum disorder must be investigated using a

number of different techniques. Many studies reviewed have explored people with autism 's post-mortem brain tissue. This is an important step in the investigation of a possible link between mitochondrial dysfunction and autism spectrum disorder.

That particular research was the primary one to observe parental iron consumption in relation to ASD in Schmidt, Tancredi, Krakowiak, Hansen and Ozonoff, (2014). Iron deficiency affects 40 percent of pregnancies-50 percent. Iron is critical for early neurodevelopmental processes with autism spectrum disorder (ASD) dysregulated. In California-born children enrolled in a population-based case-control study (the Childhood Autism Risk from Genetics and the Environment (CHARGE) study) from 2003 to 2009, we examined the intake of maternal iron in relation to the risk of ASD with a diagnosis of ASD (n= 520) or typical development (n= 346), which was clinically confirmed by standardized evaluations. The average daily intake of maternal iron was quantified on the basis of the frequency, dose and brands of supplements and cereals consumed every month from 3 months before pregnancy to the end of pregnancy and breastfeeding (index period), as reported in parental interviews. During the index period, mothers in cases were less likely to report taking iron-specific supplements Study found that mothers of children with ASD had significantly lower intakes of iron during the index than mothers of children with typical development. After adjustment for the intake of folic acid, the association between higher maternal iron intake and reduced risk of ASD was strongest during breastfeeding. In addition, the risk of ASD associated with low maternal iron intake was significantly higher when the mother was also older at the time of birth and/or during pregnancy had metabolic conditions. The limitations of this study are the retrospective reporting of vitamin and supplement information after the developmental status of the child has been known, in which mothers have been asked to recall a period several years before the interview, which raises recall accuracy and bias in this study. In addition, data on other dietary sources of iron were not collected during these years of study, so there was no information available to fully assess the intake of dietary iron. No information on why mothers took iron supplements, which are often taken after doctor's recommendations when iron deficiency anemia is detected during pregnancy, has been collected. However, case mothers reported lower intake of iron from sources other than iron-specific supplements (breakfast cereal), which in response to an anemia diagnosis would not have increased as much. Moreover, differences in the intake of iron between groups were observed not only

during late pregnancy, when anemia is more likely to be diagnosed, but throughout the index period. This shows that the association was not entirely due to indication confusion.

Gardener, Spiegelman and Buka (2009) carried out a study to carry out the first quantitative review and meta-analysis of the association between complications of maternal pregnancy and factors related to pregnancy and autism risk. More than 50 prenatal factors were examined. In meta-analysis, the factors associated with autism risk were advanced parental age at birth, the use of prenatal maternal medicines, bleeding, gestational diabetes, first born of third or later, and the birth of a foreign mother. Previous fetal loss and maternal hypertension, proteinuria, pre-eclampsia and swelling were the factors with the strongest evidence of the role in autism risk. There is insufficient evidence to involve any prenatal factor in the etiology of autism, although there is evidence that exposure to pregnancy complications can increase the risk. This study is limited by methodological limitations that have impaired the accuracy and validity of results, including the size of small samples. Twenty-one studies evaluated retrospectively the exposure variables leading to a high possibility of recall bias. These methodological weaknesses were also likely sources of study-wide heterogeneity. Although significant heterogeneity was observed for a few factors, the heterogeneity test was powerless because the majority of meta analyzes were able to include less than six studies and therefore lacked variability in study characteristics.

Hultman et al., (2011) directed a paternal age study as an autism risk factor. The present study assessed the hypothesis that the danger of autism increases by the proceeding paternalistic age in the offspring. First, the results, using data from the birth cohort, which controls a range of documented risk factors, including parental, perinatal and socio-economic variables and the year of birth, showed a strong monotonic relationship between increasing paternal age at birth and the risk of autism in offspring. Second, this effect was consistent with the pooled meta-analysis results. These findings from several large data sources provide substantial evidence to confirm that the development of autism involves paternal age. Maternal characters connected to the very same kind of autism phenotype have been suggested to explain the relationship between paternal age and autism. Such characteristics (e.g. shyness) may show a reduced ability to interact with society and may lead to an older paternal age.

However, the findings should be interpreted in the light of certain limitations. First, it was not investigated whether parental age was related to autism spectrum disorders (other than autism) diagnoses. Therefore, the results of autism spectrum disorders may not be generalized. Secondly, clinical features such as mental retardation severity and language level were not available. But we provide the strongest and most consistent evidence that advancing paternal age at birth increases the risk of autism based on data from a birth cohort, a family-based study and a meta-analysis.

Rationale

ASD now a days remains a widespread developmental illness affecting 1 in 160 births (Fombonne, 2003). Autism is a disorder of neurodevelopment. In boys, it is diagnosed four times as often as girls. Researchers have paid much attention to it, but it is a complex phenomenon and still not very well recognized. Current epidemiological researchers have identified a growth in incidence of autism during the last decade (Tidmarsh & Volkmar, 2003). Autism is a difficult disorder full of challenges not discovered. Its causes are not completely investigated anywhere in the world. Children with autism spectrum disorder have reduced communication deficits, social interactions and repetitive and ritualistic behaviors (Wetherby et al., 2004). The prevalence of autism is growing worldwide and in Pakistan as well (Fombonne, 2009) This research was therefore conducted to explore the risk factors for ASD. Based on need present study aimed at identifying the risk factors related Autism Spectrum Disorder. Risk factors included are medical, developmental, prenatal and family related risk factors. Medical risk factors like high fever, jaundice, lack of oxygen at the time of birth and taking medication (Allopathic and Homeopathic), major accidents or injuries etc.). keeping in view literature preview present the medical risk factors ASD. Developmental risk factors include (child began to do the following activities such as sit, stand, walk, feed self, dress self-etc., child is toilet trained or not and sleeping difficulties in children etc.). keeping in view literature preview present the developmental risk factors ASD. Prenatal risk factors include (mother experienced any kind of stress during pregnancy, cousin marriages, mothers' conditions during pregnancy, medication taking during pregnancy, maternal metabolic condition, mother have any vaccination during pregnancy, viral illness, infection requiring antibiotics, taking nutritional supplements during pregnancy and pesticides exposure

during pregnancy). keeping in view literature preview present the prenatal risk factors ASD. Family related risk factors include family history like emotional problems, schizophrenia etc. (Krakowiak et al, 2012; Zerbo et al, 2012; McCanlies et al, 2012 & Frye, 2011).

METHOD

Chapter 2

METHOD

Objectives

To study the risk factors of Autism Spectrum Disorder (medical, developmental, prenatal and family related risk factors).

Hypothesis

1. A relationship will be present between medical risk factors (high fever, jaundice, lack of oxygen at the time of birth and taking medication (Allopathic and Homeopathic), major accidents or injuries etc.) and Autism Spectrum Disorder.
2. A relationship will be present between developmental risk factors (child began to do the following activities such as sit, stand, walk, feed self, dress self-etc., child is toilet trained or not and sleeping difficulties in children etc.) and ASD.
3. A relationship will present between prenatal risk factors (mother experienced any kind of stress during pregnancy, cousin marriages, maternal metabolic condition, mother have any vaccination during pregnancy, viral illness, infection requiring antibiotics, taking nutritional supplements during pregnancy and pesticides exposure during pregnancy) and ASD.
4. A relationship will be present between family related risk factors (emotional problems, schizophrenia etc.) in family history and ASD.

Instruments

In order to measure the study variables, the following instruments were used.

Demographic Sheet

In order to explore variety of demographic variables e.g. child's age, gender, mother's age (at the time of child's birth), mother's occupation, father's age, father's occupation (at the time of child's birth), family income and children in family etc., and detailed demographic sheet was developed.

Risk Factor for Autism Spectrum Disorder Checklist

For the present study, the risk factors checklist was developed.

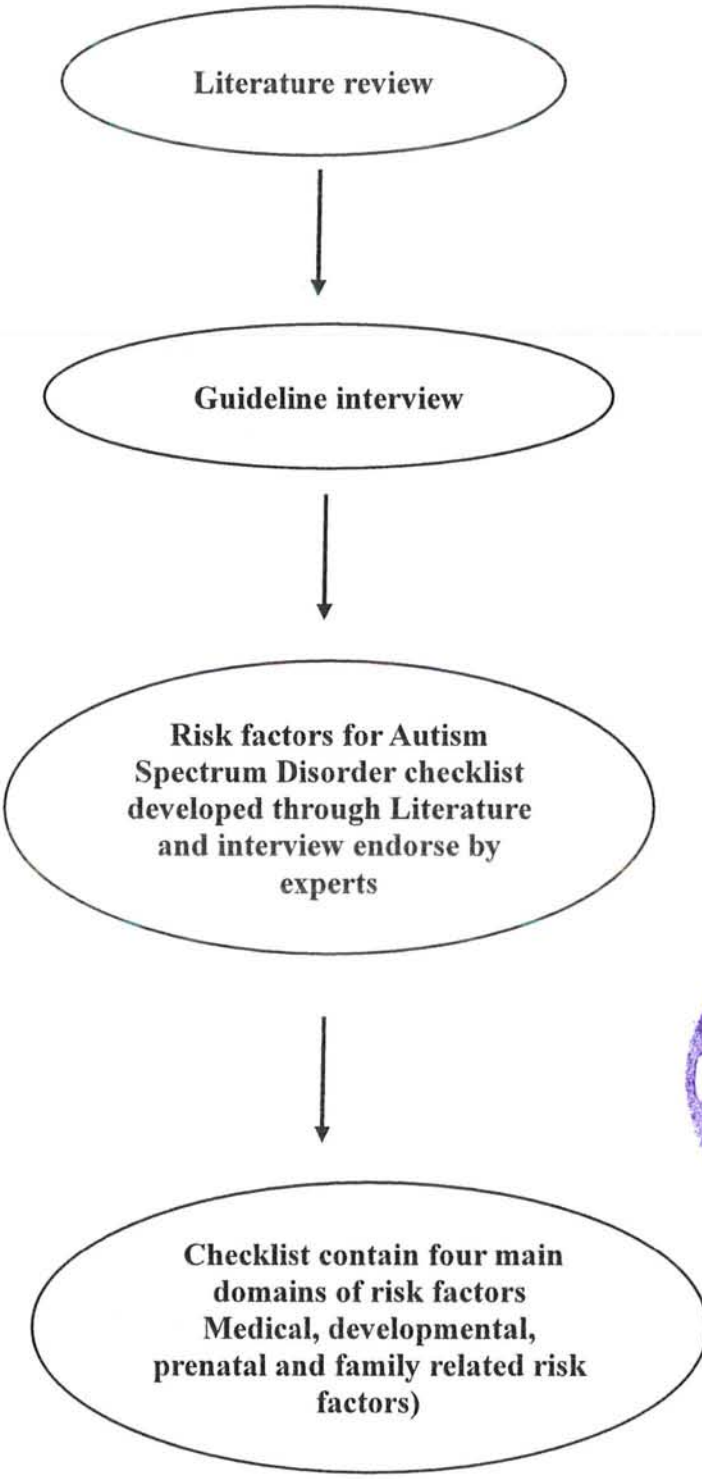

Figure 1. Development of risk factors based ASD checklist in present study.

Gilliam Autism Rating Scale-Second Edition (GARS2)

The Gilliam Autism Rating Scale-Second Edition (GARS-2) is a screening tool for autism spectrum disorders for people aged 3 to 22. GARS 2 consists of three

subscales of 14 items, each based on the American Psychiatric Association's definitions of autism (2000) and the American Autism Society (2003).

Stereotyped Behaviors, the first sub measuring scale, holds objects ranging 1 to 14. Communication, with second sub measuring scale, holds objects ranging from15 to 28. The third subscale of social interaction contains items 29 to 42. GARS 2 has good psychometric properties and has been shown to identify people with autism effectively. The GARS ' internal consistency was determined using the alpha technique of Cronbach. Several studies have confirmed the validity of GARS. Each sub-scale analysis of items recognized that the subscale items of GARS 2 are very consistent and discriminatory. Concurrent validity studies related to the criterion have confirmed that GARS-2 cascaras are used to recognize persons belonging to changed diagnostic groups. Positive prediction analyzes have shown that GARS 2 can discriminate between persons with autism and children with mental retardation, children with multiple disabilities and children deprived of disabilities (Gilliam, 2006).

Sample

In recent research sample consist of 60 mothers of children with autism Spectrum Disorder and teachers. For data collection non-probability purposive was used. Participants were selected from different special schools, public and private hospitals of Rawalpindi and Islamabad. Following the ethical protocol of research formal permission was taken from the special schools and hospital administration.

Table 1

Frequency and Percentage of Demographic Variables of the Study Sample (N = 60)

Demographic Variables	*f* (%)
Information About Children with Autism	
Child's Age	
2-8 years	32 (53.3)
9-15 years	25 (41.7)
16-21 years	3 (5)
Child's Gender	
Boy	36 (60)
Girl	24 (40)
Information About Parents	
Mother Age (at time of child's birth)	
16-25 years	21 (35)
26-35 years	21 (35)
36-45 years	14 (23)
Mother Occupation	
Working	23 (38.3)
Non-working	37 (61.7)
Father Age (at time of child's birth)	
25-35 years	24 (40)
36-45 years	26 (43.3)
Father Occupation	
Working	53 (86.6)
Non- working	7 (11.5)
Family Related information	
Family Income	
than 25,000	24(40)
25,000-65,000	34(56.7)
65,000-250,000	2(3.3)

Above 250,000	0 (0)
Children in Family	
1-4	32 (52.5)
5-8	23 (37.7)
Twins	8 (13.1)

In Table 1 demographic variables have been displayed along with their frequency and percentages. The variables include information about children with autism (age, gender), information about parents (age, education, occupation) and family related information. 53.3% sample comprised of children with autism between the age 2-8 years where 41.7% of the children with autism between the age 9-15 years. Only 5% sample comprised of children with autism between the age 16-21 years. the percentage of gender is 60 % are boys and 40 % are girls. 90 % of the children diagnosed with autism acknowledge from the experts where only 4 cases diagnosed with autism having comorbidity (Cerebral palsy, Down Syndrome, Fits problem, Mentally Retarded).

Procedure

In this research data was collected through non-probability purposive sampling technique from special schools, public and private sector hospitals. Informed consent was given to the participants and through this approval of participants was taken. Participants were briefed about the aim of the study. Participants who were agreed were insured that data would be kept confidential and would only use for research purpose. Questionnaires were given to the participants and requested them to fill it as honestly as possible. Their queries about the questionnaire were answered effectively. At the completion of the questionnaire participants were appreciated for their participation.

Sample will consist of mothers, teachers and doctors from special schools, public and private hospitals of Rawalpindi and Islamabad. Permission from schools and hospital authority will be taken and the authority will be informed about the nature of study.

RESULTS

Chapter 3

RESULTS

In order to achieve the purposes of the current study, appropriate statistical analyses were used to analyze the data. Descriptive statistics mostly frequency and percentage were computed for all the measures in the study in order to examine the overall trend to data.

Data were analyzed in four main domains, which we had identified through literature review. The domains are Medical, Developmental, Prenatal and family related danger aspects of Autism Spectrum Disorder.

Medical Risk Aspect of Autism Spectrum Disorder

Table 2 (a)

Percentages Showing Age Range in which the Problem of the Child was first Noticed (N = 60)

	Frequency	%
1-5 years	49	83.3
6-10 years	10	16.4

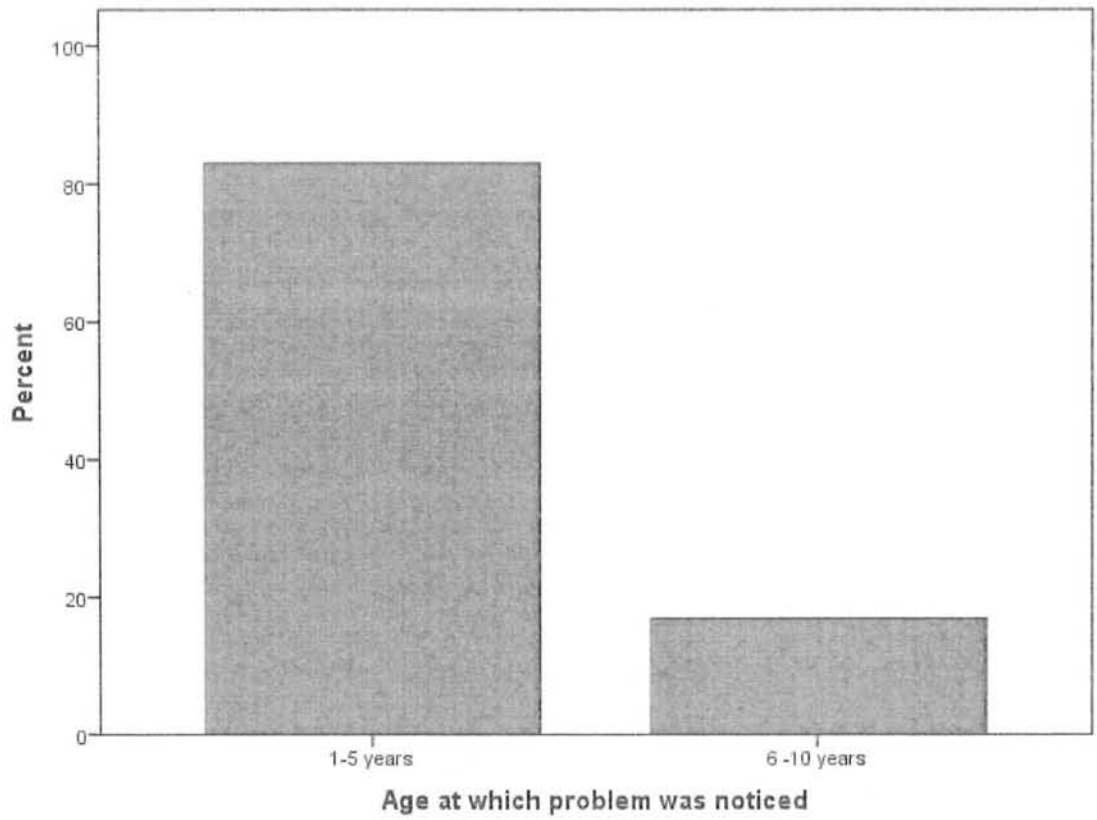

Figure 2 (a). Age at which Problem was Noticed

Figure 2 (a) illustrates percentages of age range at which parents identified the problem in their children. Most of the mother (83.3%) reported that they first identified the problem in their children between age range 1-5 years. Only 16.4% reported that they first noticed the problem in their children between age range 6-10 years

Table 2 (b)

Percentages Showing the Actual Diagnosis of Child (N=60)

	Frequency	%
Autism	55	90.0
Autism with fits problem	1	1.6
Autism with cerebral palsy	1	1.7
Autism with down syndrome	2	3.3
Autism with mentally retarded	1	1.7

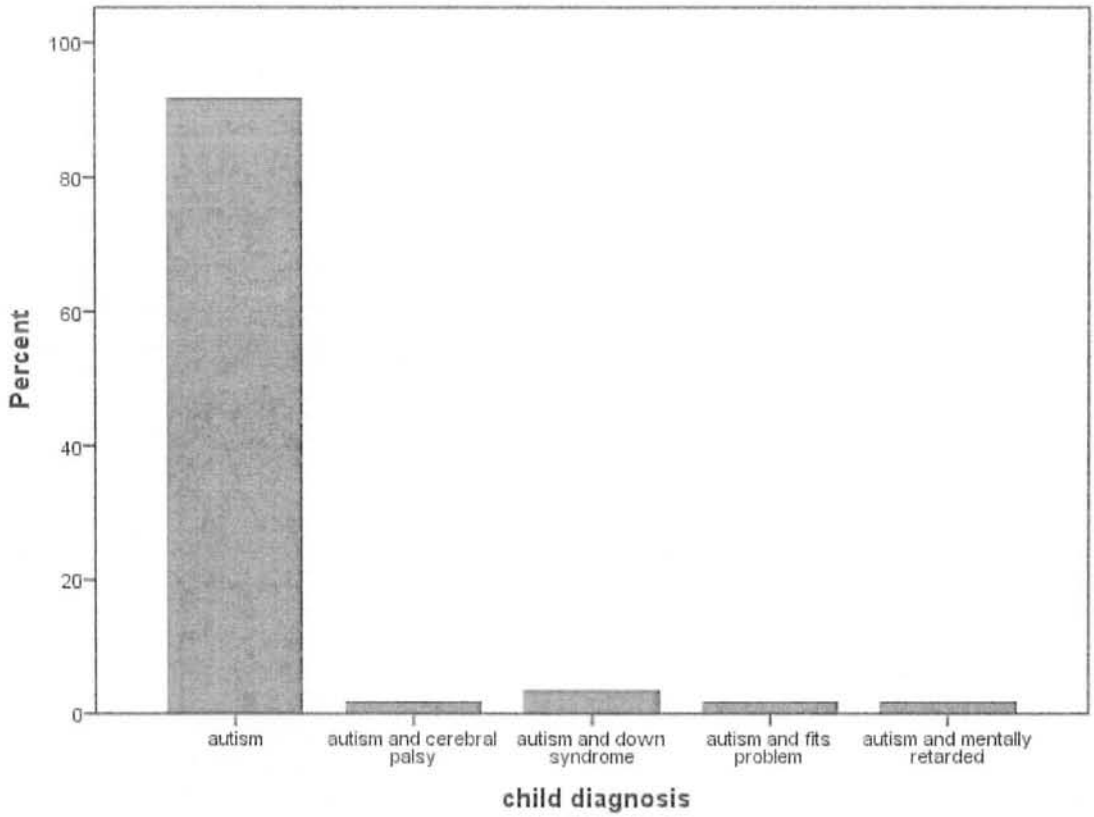

Figure 2 (b). Actual Diagnosis of Children

Figure 2 (b) illustrate percentages of actual diagnosis of children. Most of the mother reported that (90%) of the children diagnosed with autism acknowledge from the experts. Only in 4 cases (3.3%) mother reported that their children diagnosed with autism having comorbidity (Cerebral palsy, Down Syndrome, Fits problem, Mentally Retarded).

Table 2 (c)

Percentages showing age range of children when actual diagnosed was done (N=60)

	Frequency	%
1-5 years	47	79.7
6-10 years	12	20.3

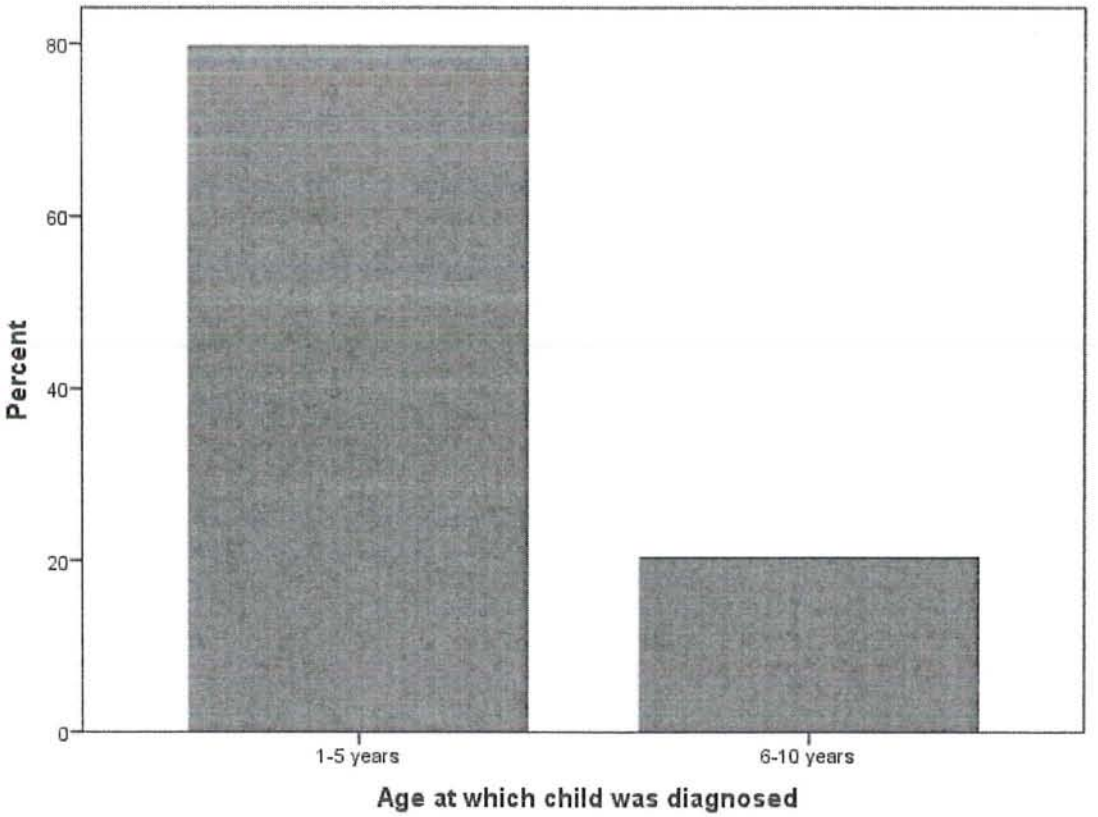

Figure 2 (c). Age At which Child was Diagnosed

Figure 2 (c) illustrate percentages of age range of children when actual diagnosis was done. Most of the mothers (77%) reported that their children were diagnosed between 1-5 years and 19.7% reported that their children diagnosed between 6-10 years.

Table 3 (a)

Percentages Showing Medical Conditions Experienced by Children after Birth (N=60)

	Frequency	%
Lack of oxygen at the time of birth	1	1.7
Pneumonia and high fever	2	3.3
Influenza, pneumonia and high fever	7	11.7
Mumps, jaundice, influenza, pneumonia, high fever and seizure	3	5.0
Jaundice, lack of oxygen at the time of birth, pneumonia and high fever	2	3.3
Influenza and lack of oxygen at the time of birth	1	1.7
Jaundice and pneumonia	1	1.7
High fever	3	5.0
Mumps, jaundice, influenza and high fever	2	3.3
Influenza	1	1.7
Jaundice, influenza, lack of oxygen at the time of birth, pneumonia and high fever	23	38.3
Influenza, jaundice, pneumonia, high fever	1	1.7
Influenza and high fever	4	6.7
Influenza, lack of oxygen at the time of birth, pneumonia and high fever	4	6.7
High fever and seizures	1	1.7
Jaundice, pneumonia and high fever	3	5.0
None of these	1	1.7

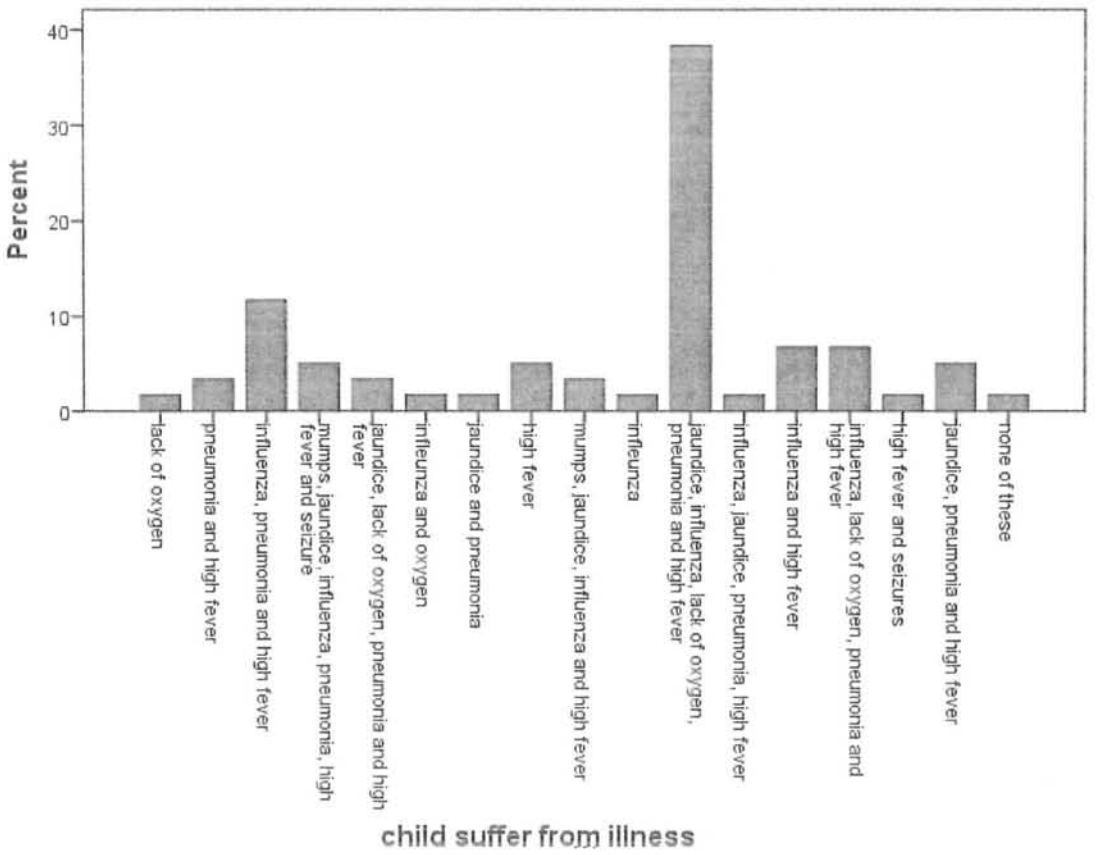

Figure 3 (a). Medical Conditions Experienced by Children

Figure 3 (a) illustrates percentages of medical conditions experienced by children. As reported by mother 1.7% of the children have lack of oxygen at time of birth, 3.3% reported that their children were suffering from pneumonia and high fever, 11.7% reported that their children were suffering from Influenza, pneumonia and high fever, 5% reported that their children were suffering from mumps, jaundice, influenza, pneumonia, high fever and seizure, 3.3% reported that their children were suffering from jaundice, lack of oxygen, pneumonia and high fever, 1.7% reported that their children were suffering from influenza and lack of oxygen at time of birth, 1.7% reported that their children were suffering from Jaundice and pneumonia, 5% reported that their children were suffering from high fever, 3.3% reported that their children were suffering from mumps, jaundice, influenza and high fever, 1.7% reported that their children were suffering from influenza, 38.3% reported that their children were suffering from Jaundice, influenza, lack of oxygen, pneumonia and high fever, 1.7% stated that their children were anguish from Influenza, jaundice, pneumonia, high fever, 6.7% reported that their children were suffering from

Influenza, high fever, 6.7% reported that their children were suffering from Influenza, lack of oxygen at the time of birth , pneumonia, high fever, 1.7% stated that their offspring were anguish from high fever and seizures, 5% reported that their children were suffering from jaundice, pneumonia, high fever and 1.7% reported that their children were not suffering from any medical conditions.

Table 3 (b)

Percentages Showing the Ages at which Children Experienced the Medical Conditions or Illness after Birth (N=60)

	Frequency	%
1 year	12	19.7
2 years	16	26.2
3 years	6	9.8
4 years	2	3.3
5 years	2	3.3

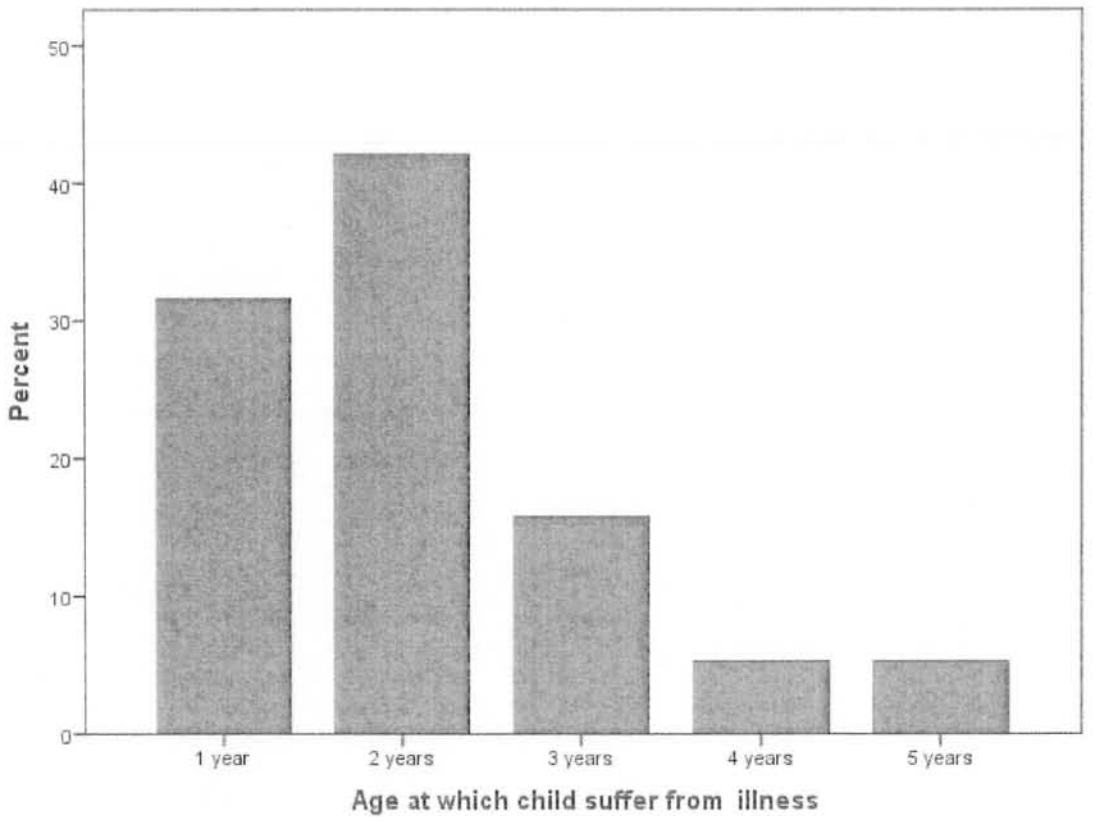

Figure 3 (b). Ages at which Children Experienced the Medical Conditions

Figure 3 (b) illustrates percentages of the ages at which children experienced the medical condition or illness after birth most of the mothers (26.2%) reported that their children suffer from medical conditions in 2 years, 19.7% of the children suffer from medical conditions in 1 year where as 9.8% of the children suffer from medical conditions in 3 years but only 3.3% of the children suffer from medical conditions or illness in 4 and 5 years.

Table 4

Percentages Showing Children Weight at Birth (N = 60)

	Frequency	%
2	15	24.6
2.5	18	29.5
3	13	21.3
3.5	4	6.6
4	2	3.3
5	3	4.9
6	2	3.3

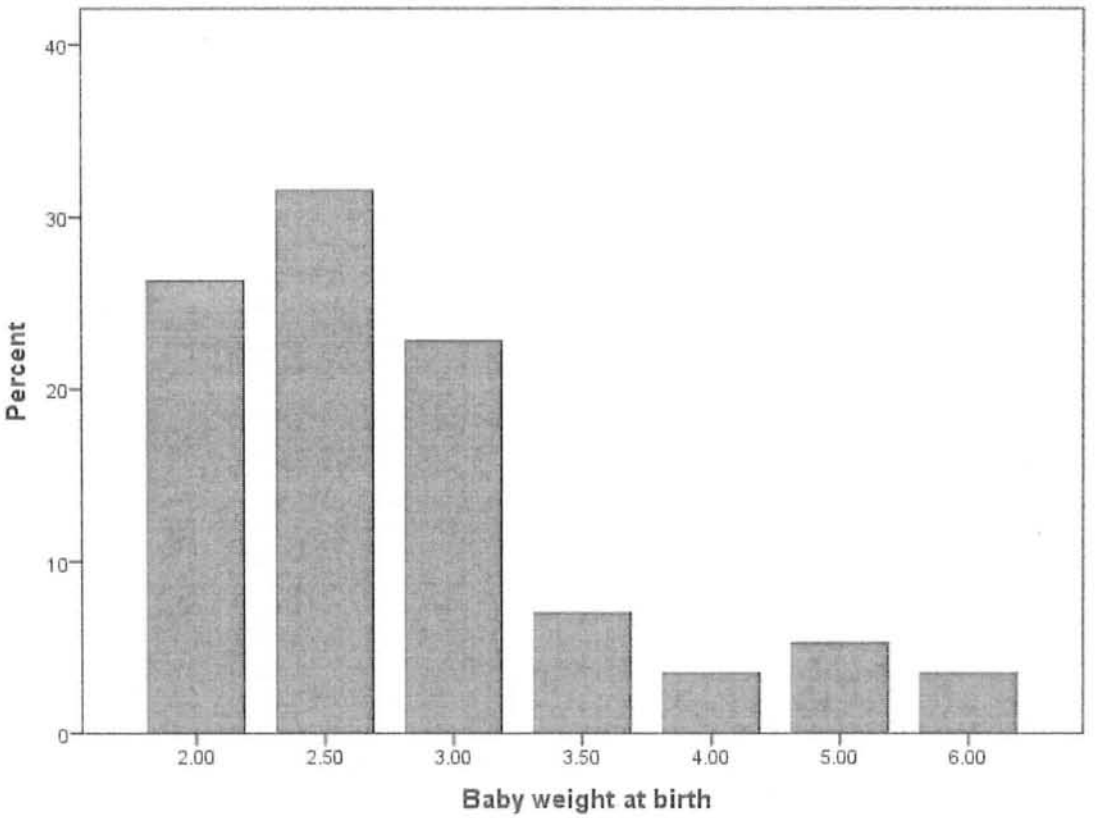

Figure 4. Children Weigh at Time of Birth

Figure 4 illustrates percentages of the children weigh at time of birth. As reported by mothers 24.6% of the children weigh were 2 pounds at the time of birth, 29.5% reported that their children weigh were 2.5 pounds at the time of birth, 24.6% reported that their children weigh were 2 pounds at the time of birth, 21.3% reported that their children weigh were 3 pounds at the time of birth, 6.6% reported that their children weigh were 3.5 pounds at the time of birth, 3.3% reported that their children weigh were 4 pounds at the time of birth, 4.9% reported that their children weigh were 5 pounds at the time of birth and 3.3% reported that their children weigh were 6 pounds at the time of birth.

Table 5

Percentages Showing Major Accident or Hospitalization of the Children After Birth (N = 60)

	Frequency	%
Yes	22	36.7
No	38	63.3

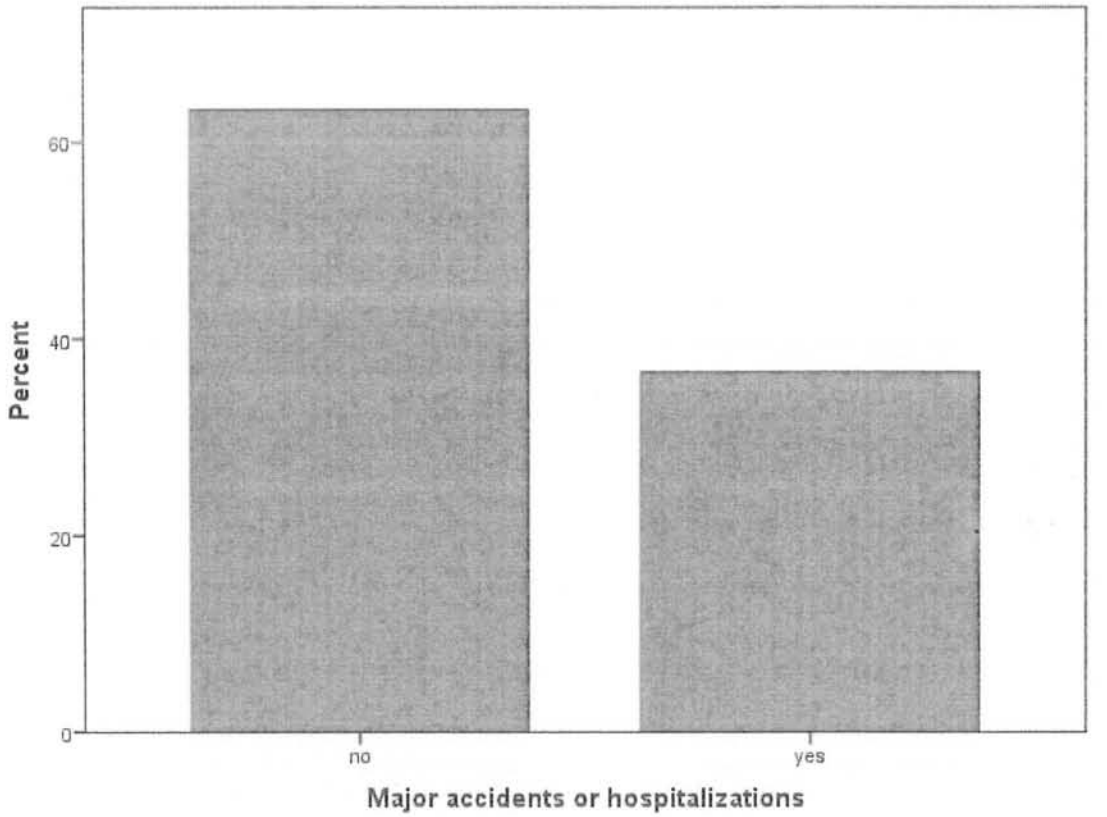

Figure 5. Major Accident or Hospitalization of the Children After Birth

Figure 5 illustrates percentages of major accident or hospitalization of the children after birth. Most of the mothers reported that 36.7% of the children has been hospitalized and 63.3% reported that their children had not been hospitalized.

Table 6 (a)

Percentages Showing the Child Taking Medications (Allopathic and Homeopathic) (N = 60)

	Frequency	%
Allopathic	5	8.3
Homeopathic	22	36.7
Both Allopathic and Homeopathic	33	55.0

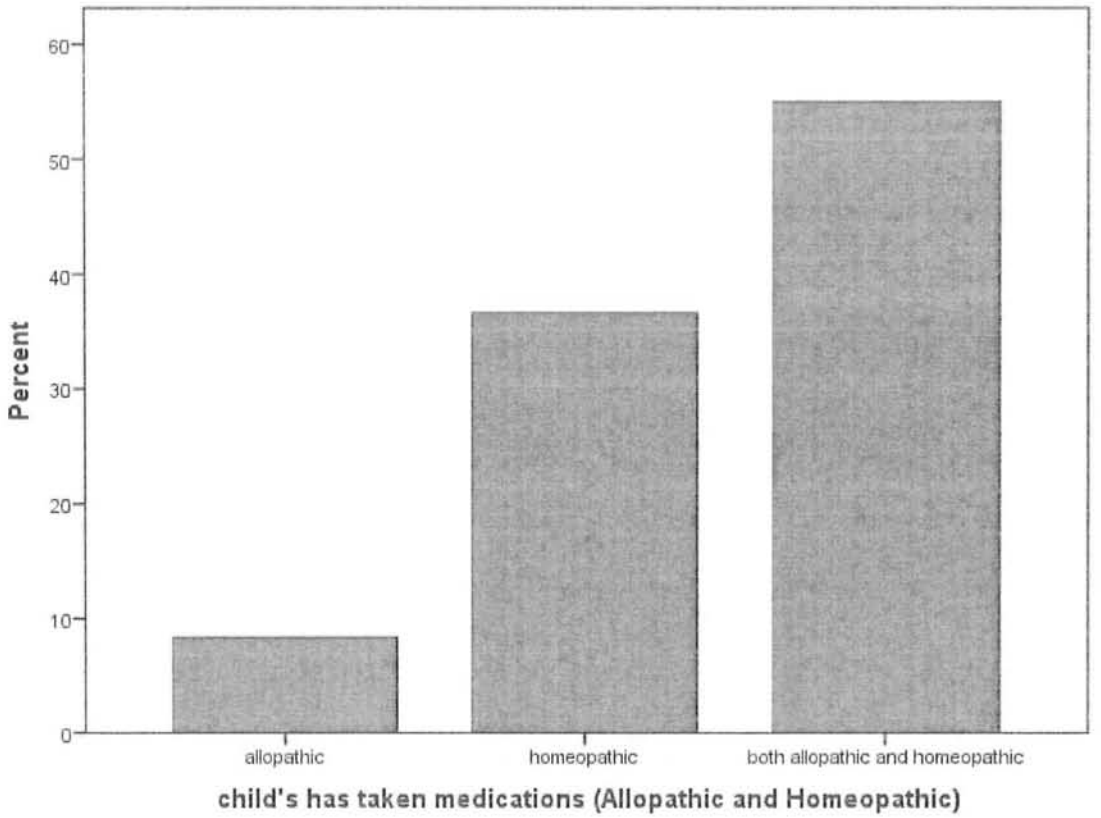

Figure 6 (a). Children Taking Medications (Allopathic and Homeopathic)

Figure 6 (a) illustrates percentages of children taking medications (Allopathic and Homeopathic). As reported by mothers, 8.3% reported that their children were taking Allopathic medicines. Moreover, 36.7% reported that their children were taking Homeopathic medicines and 55% reported that their children were taking both Allopathic and Homeopathic medications.

Table 6 (b)

Percentages Showing Negative Reactions to any Medications (Allopathic and Homeopathic) (N = 60)

	Frequency	%
Yes	3	5
No	57	95

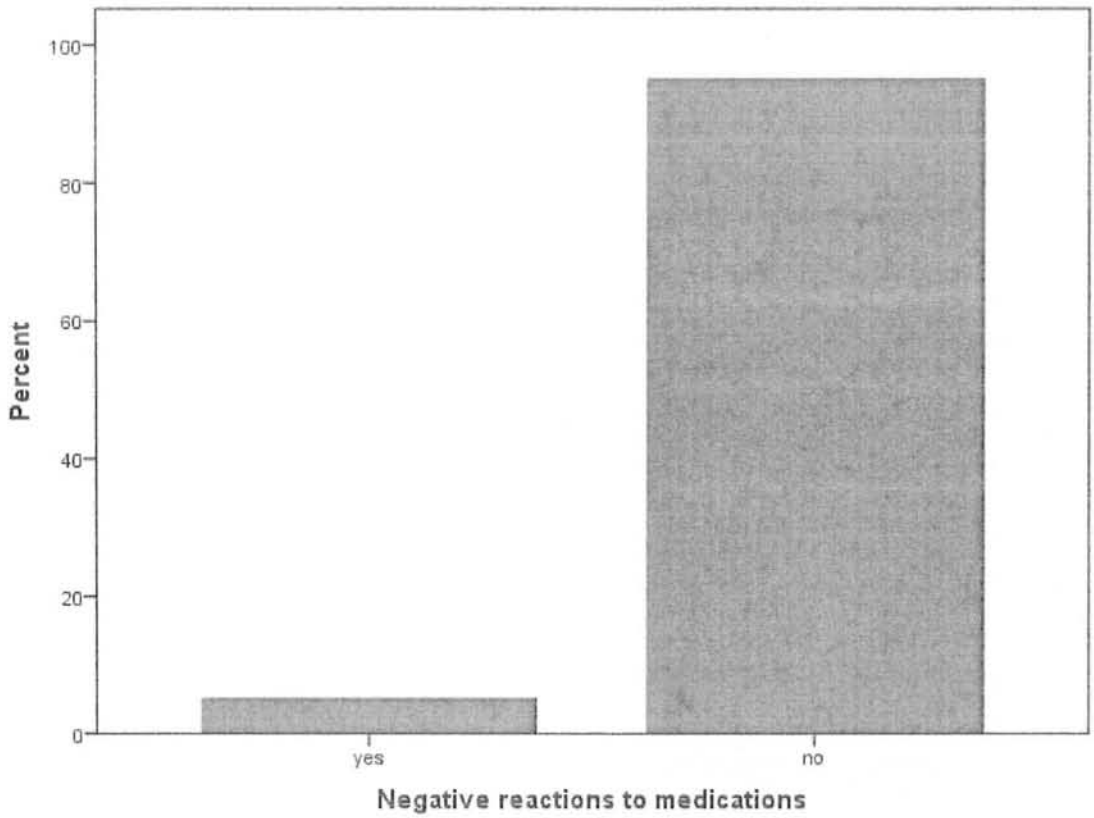

Figure 6 (b). Negative Reactions to Medications

Figure 6 (b) illustrates percentages of negative reactions to medications .as reported by mothers, only 5% reported that their children showing negative reactions to medications and 95% reported that their children had not been negative reactions to medications.

Table 7

Percentages Showing the Children that Had Been Taken to a Spiritual Healer (N = 60)

	Frequency	%
Yes	55	91.7
No	5	8.3

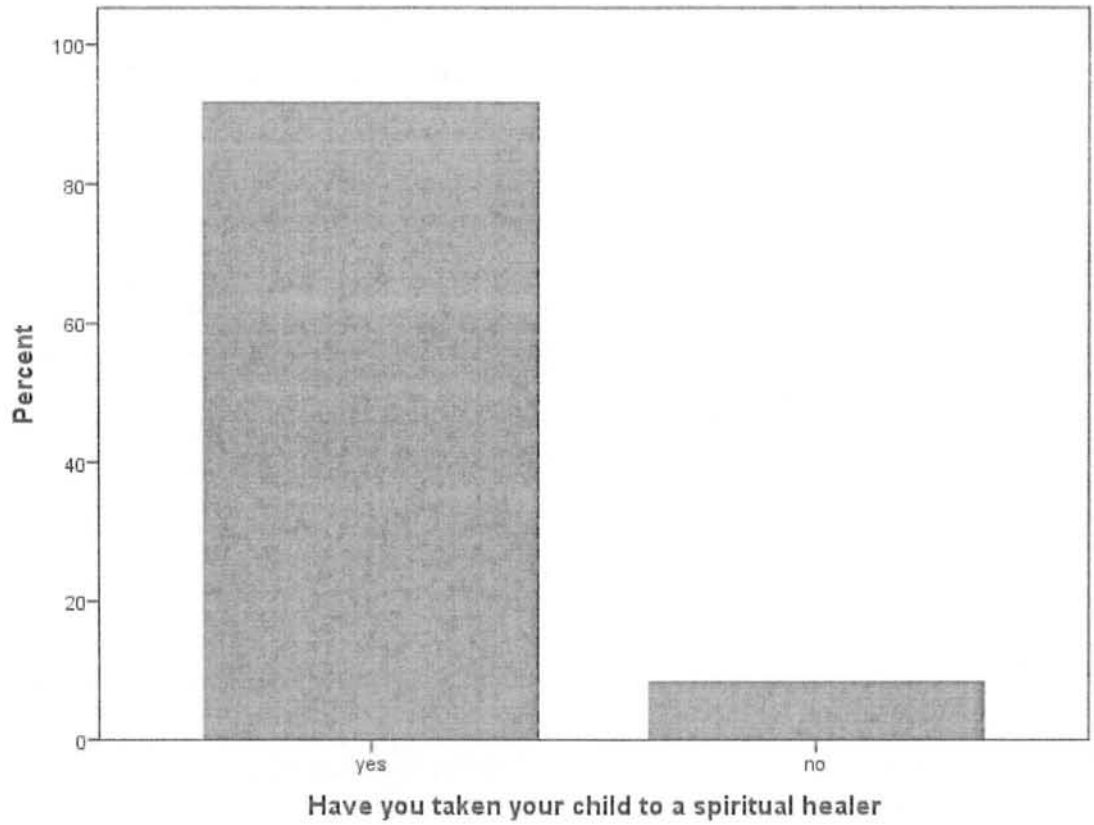

Figure 7. Children that had Been Taking to A Spiritual Healer

Figure 7 illustrates percentages of children that had been taking to a spiritual Healer. As reported by mothers, 91.7% reported that their children were taking to a spiritual Healer and 8.3% reported that their children were not taking to spiritual Healer.

Developmental Risk Factors for Autism Spectrum Disorder

Table 8

Percentage Showing Estimated Age at Which the Child Started to do Subsequent Actions (Crawl Sit, Stand, Speech Walk, Feed Self and Dress Self) (N = 60)

	Frequency	%
Delayed	34	56.7
Miles stone achieve on time	26	43.3

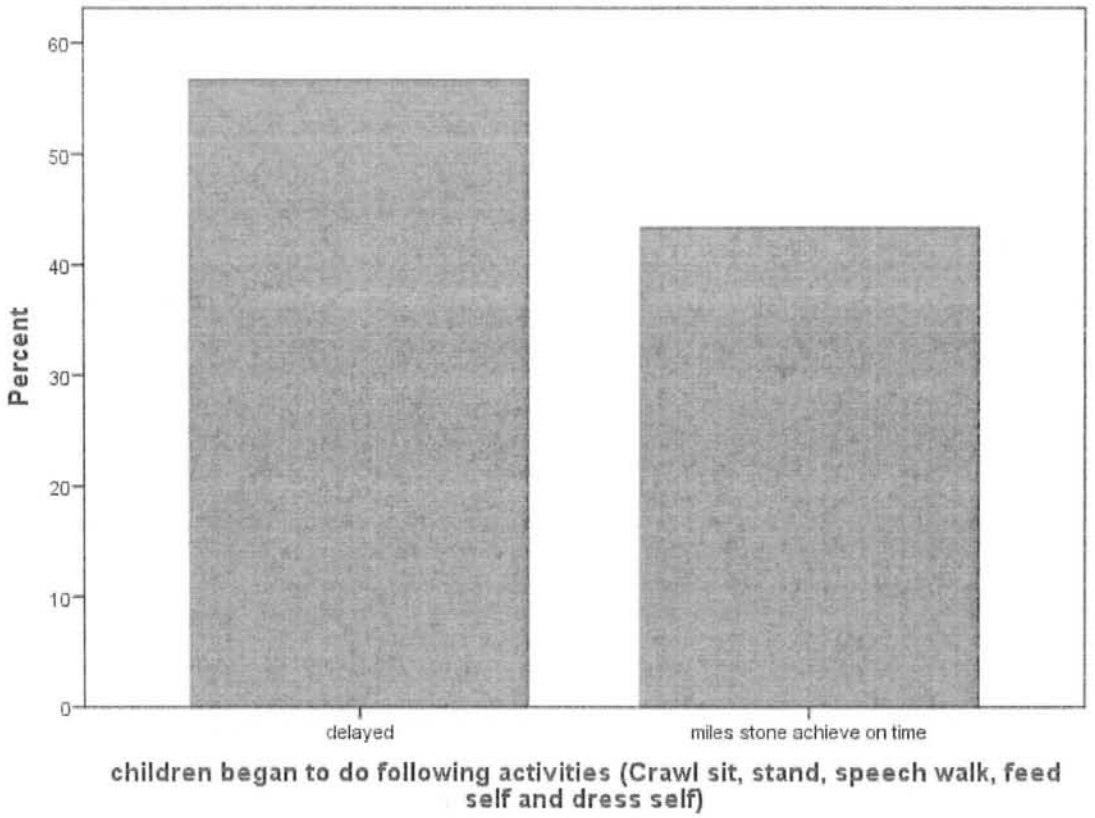

Figure 8. Children Started to Do the Following Actions (Crawl Sit, Stand, Speech Walk, Feed Self and Dress Self)

Figure 8 illustrates percentages children started to do the following actions (Crawl sit, stand, speech walk, feed self and dress self). Most of the mothers (56.7%) reported that their children delayed in subsequent actions (Creep sit, stand, speech walk, feed self and dress self) where as 43.3% reported that their children have achieve their miles stone on time.

Table 9 (a)

Percentages Showing Whether the Child is Toilet Trained Or Not (N = 60)

	Frequency	%
Yes	22	36.7
No	38	63.3

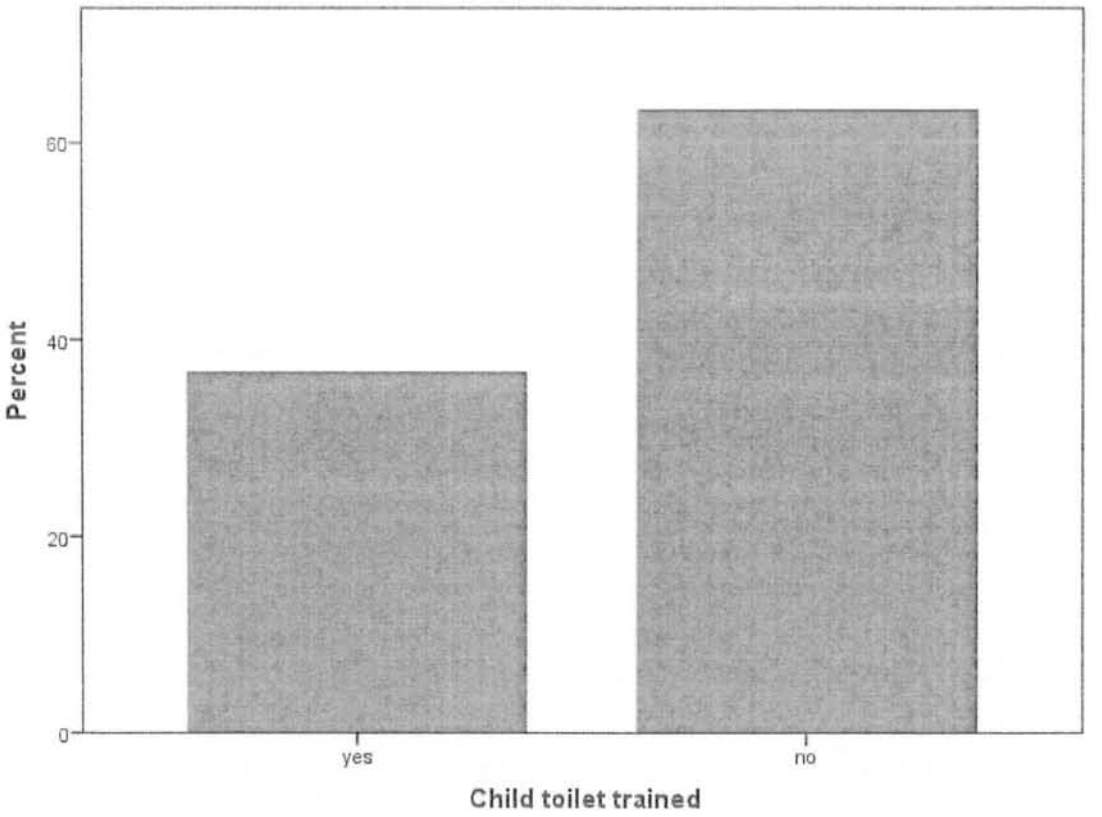

Figure 9 (a). Whether the Child Is Toiled Trained or Not

Figure 9 (a) illustrates percentages whether the child is toiled trained or not. As reported by mothers, 36.7% stated that their children were toilet skilled and 63.3% has not been toilet trained.

Table 9 (b)

Percentage Showing if Yes at What Age Child was Toilet Trained (N = 60)

	Frequency	%
1-5 years	9	15.0
6-10 years	8	13.3
No	38	63.3

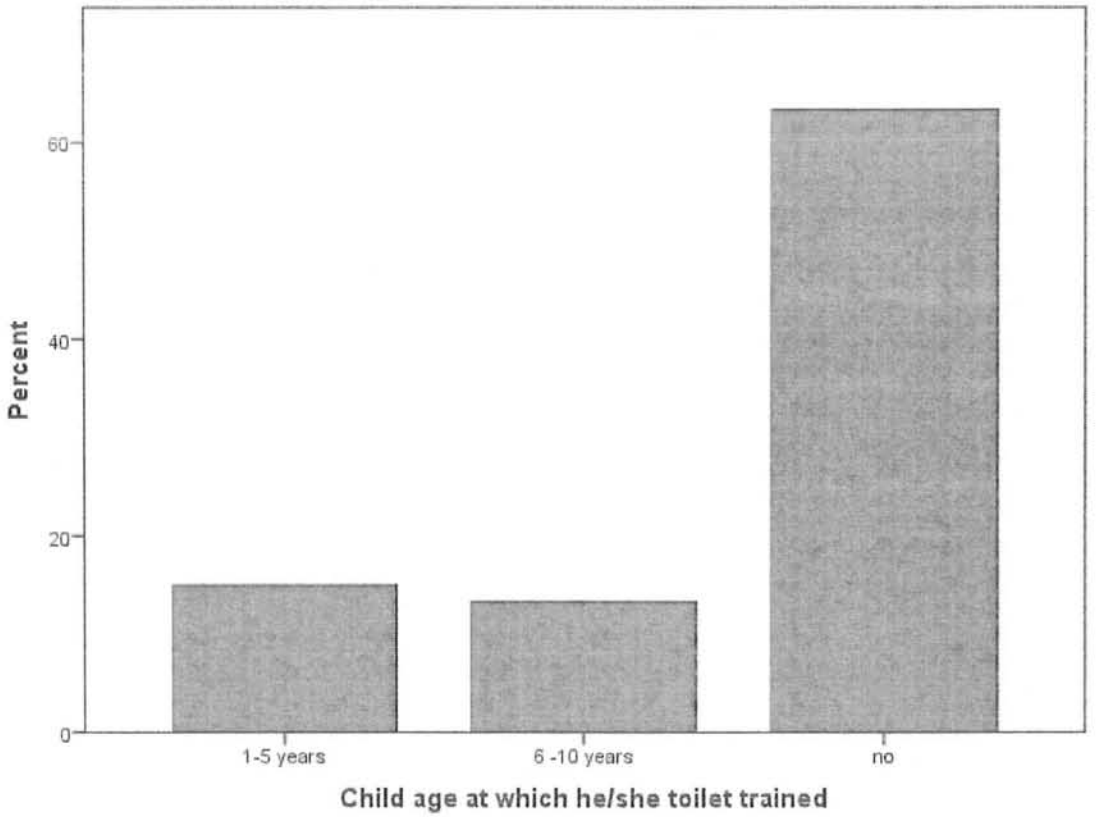

Figure 9 (b). Children Age at which children were Toilet Trained

Figure 9 (b) illustrates percentages of children age at which he/she was toilet trained. As reported by mothers, 15% stated that their children were toilet trained between 1-5 years, 13.3% stated that their children were toilet trained between 6-10 years. Moreover 63.3% stated that their children were not toilet trained.

Table 10

Percentage Showing Sleep Difficulties in Children (N = 60)

	Frequency	%
Yes	45	75.0
No	15	25.0

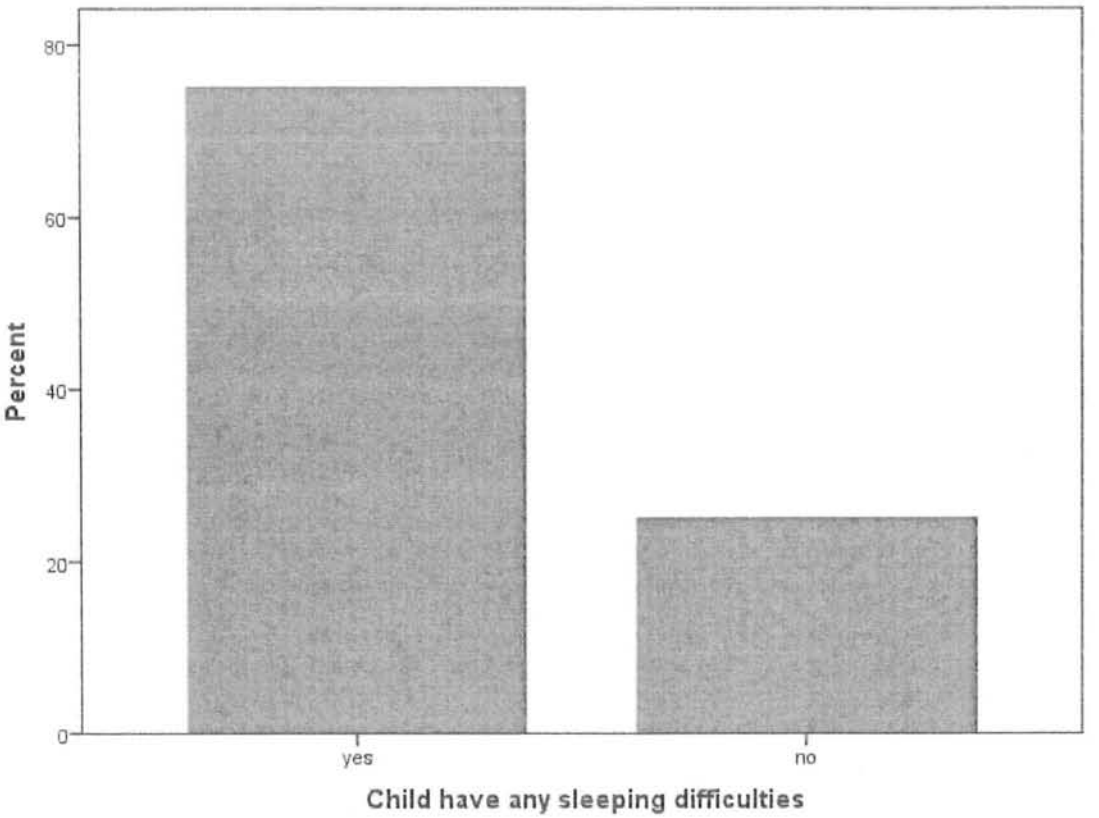

Figure 10. Children Having Sleep Difficulties

Figure 10 illustrates percentages of children having sleep difficulties. As reported by mothers 75% reported that their children having sleep difficulties where as 25% reported that their having no sleep difficulties.

Prenatal Risk Factors for Autism Spectrum Disorder

Table 11

Percentages Showing was the Pregnancy Planned (N = 60)

	Frequency	%
Yes	18	29.5
No	42	68.9

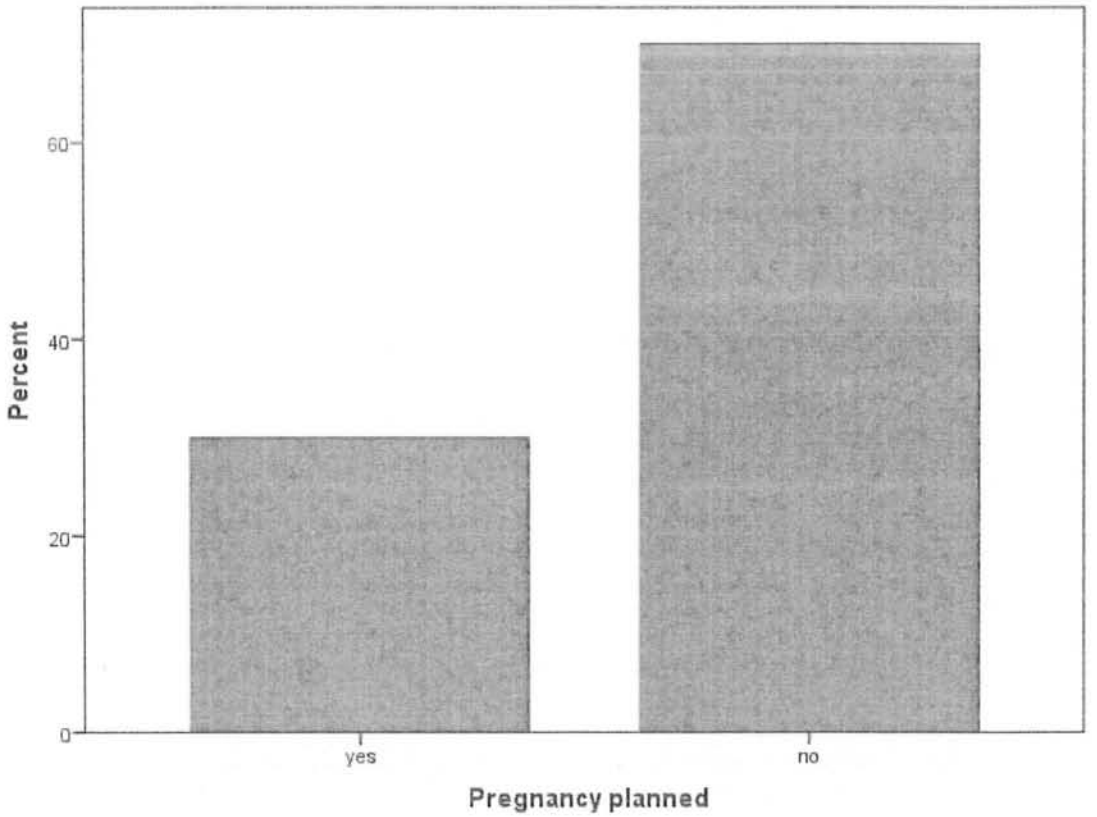

Figure 11. Pregnancy was Planned

Figure 11 illustrates percentages of pregnancy was planned. As reported by mothers, 29.5% reported that their pregnancy was planned where as 68.9% reported that their pregnancy was not planned.

Table 12

Percentages Showing Mother Experienced Any Kind of Stress During Pregnancy (N = 60)

	Frequency	%
Yes	55	91.7
No	5	8.3

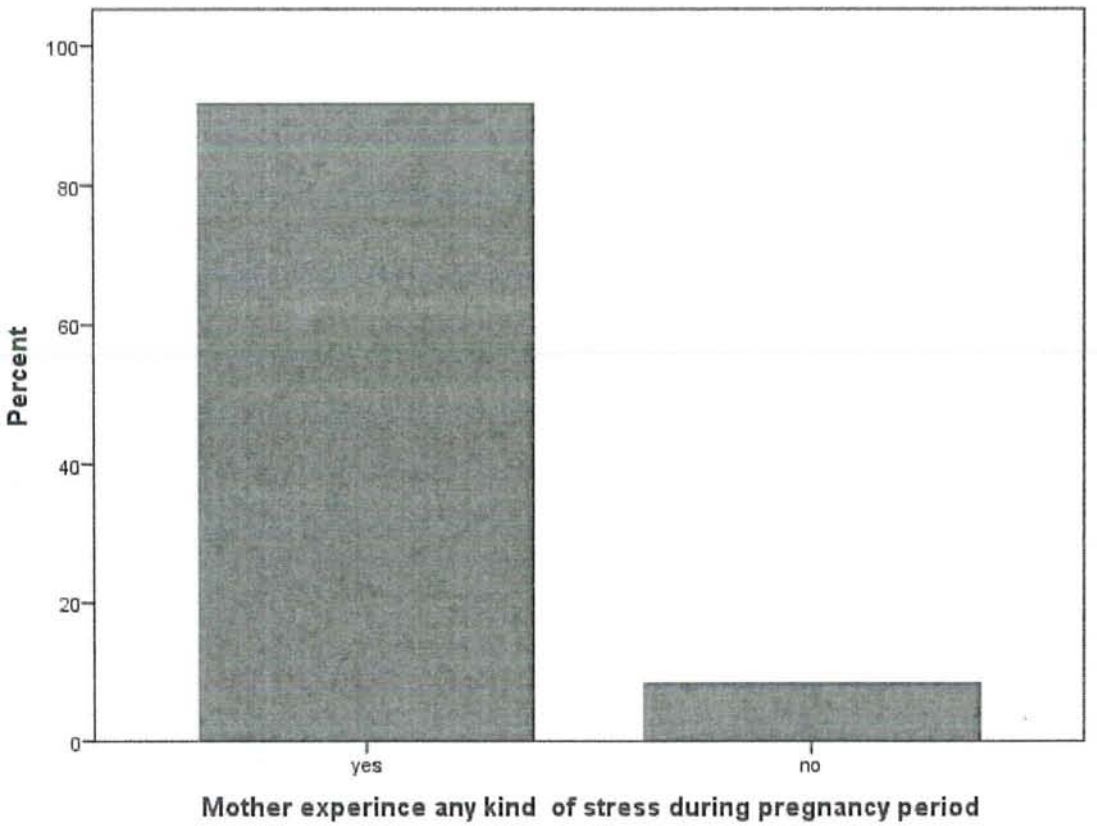

Figure 12. Mother Experienced Any Kind of Stress During Pregnancy

Figure 12 illustrates percentages of mother experienced any kind of stress during pregnancy. Most of the mothers (91.7%) reported that they experienced stress during pregnancy and 8.3% reported that they did not experienced any stress during pregnancy.

Table 13

Percentages Showing Cousin Marriage (N = 60)

	Frequency	%
Yes	51	85
No	9	15

Figure 13. Both Mother and Father Cousins to Each Other (Cousin Marriage)

Figure 13 illustrates percentages of both mother and father cousins to each other (cousin marriage). As reported by mothers 85% of the mother and father are cousins to each other and 15% of the mother and father are not cousins to each other.

Table 14

Percentages Showing Season of Conception of the Baby (N = 60)

	Frequency	%
Spring	3	5
Summer	5	8.3
Winter	28	46.7

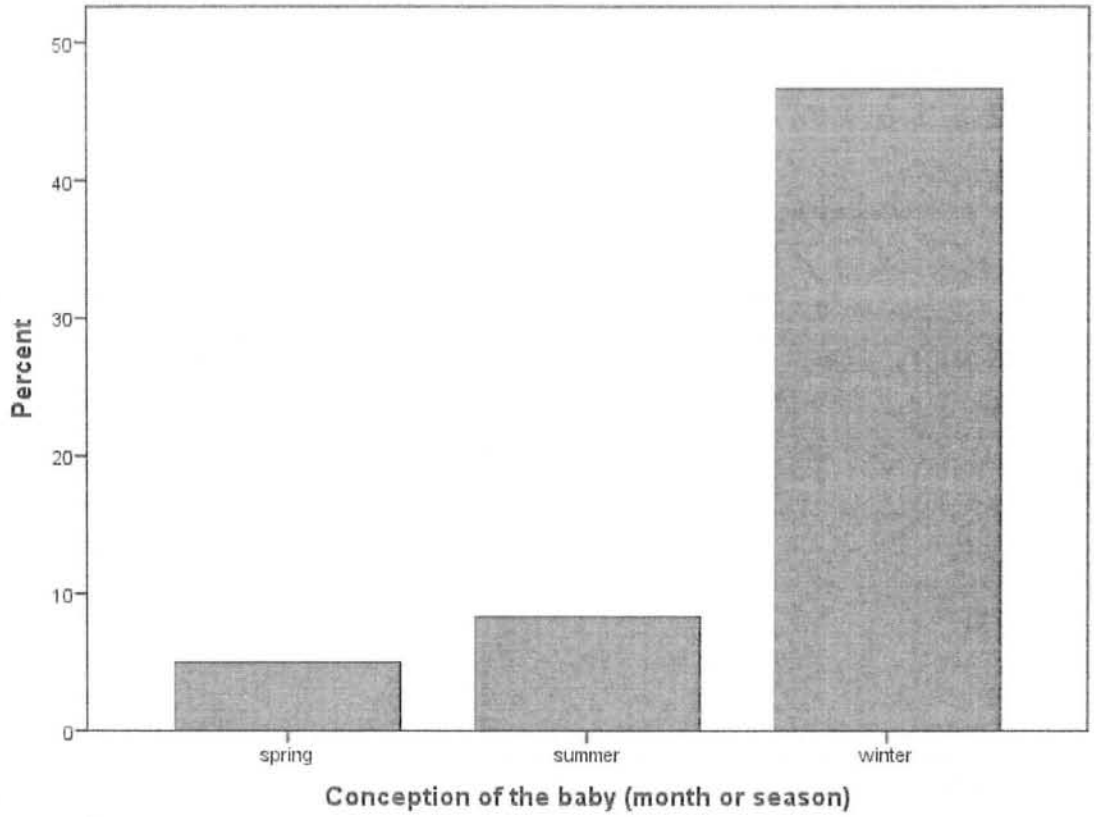

Figure 14. Season of Conceptions of the Baby

Figure 14 illustrates percentages of season of conceptions of the baby. As reported by mothers, 5% reported that they were conceived the baby in spring season, whereas 8.3% reported that they were conceived the baby in summer season. Most of the mothers (46.7%) reported that they were conceived the baby in winter.

Table 15

Percentage Showing Mother's Condition During Pregnancy (N = 60)

	Frequency	%
Over age (over 35 during pregnancy)	2	3.3
Fever	8	13.3
Fever and Diabetes	28	46.7
Fever, Over age (above 35 year of age during pregnancy) and Diabetes	14	23.3
Diabetes	1	1.7
Fever, Under age (below 17 year of age during pregnancy) and Diabetes	4	6.7
Fever and Over age (over 35 during pregnancy)	1	1.7
None of these	2	3.3

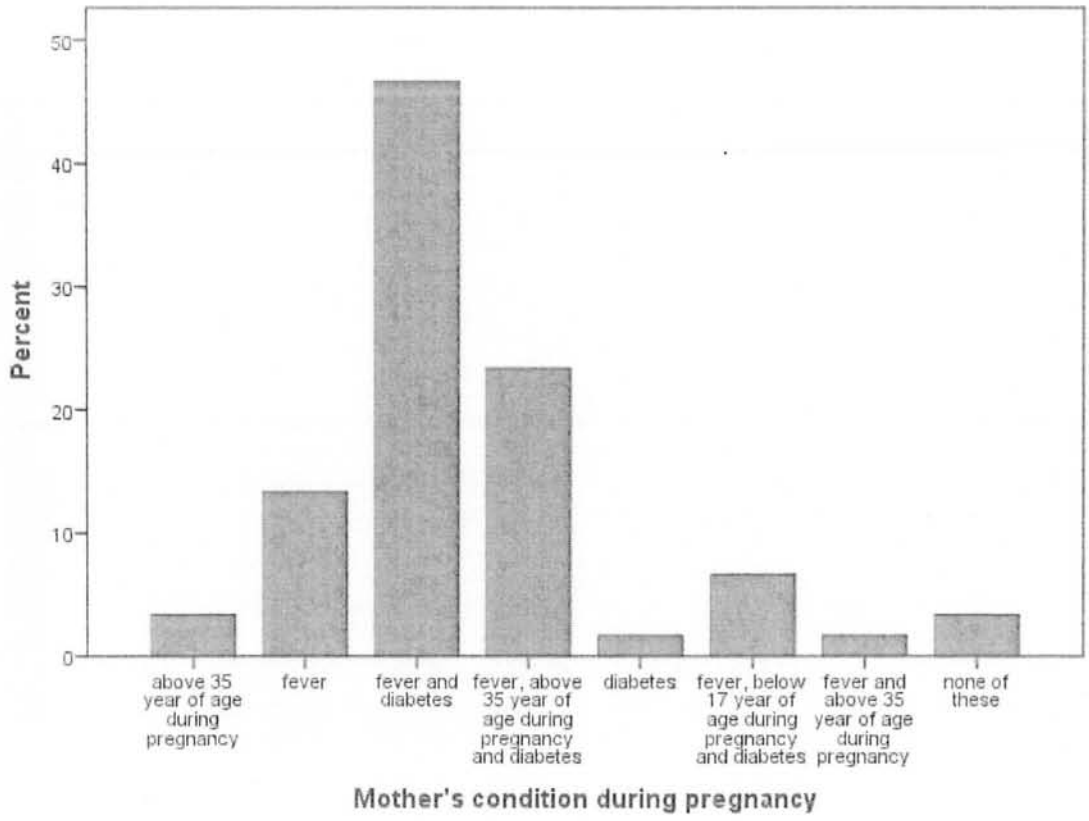

Figure 15. Mother's Condition During Pregnancy

Figure 15 illustrates percentages of mother's condition during pregnancy. As mothers reported, 3.3% reported that they were over age (above 35 year of age during pregnancy), 13.3% reported that they had fever during pregnancy, 46.7 reported that they had fever and diabetes during pregnancy, 23.3% reported that they had fever, diabetes and over age (above 35 year of age during pregnancy), 1.7% reported that they had diabetes during pregnancy, 6.7% reported that they had fever, diabetes and under age (below 17 year of age during pregnancy), 1.7% reported that they had fever and over age (above 35 year of age during pregnancy and 3.3% reported that they had no problem.

Table 16

Percentage Showing Mothers Taking Any Medication Taken During Pregnancy (N = 60)

	Frequency	%
Yes	34	56.7
No	26	43.3

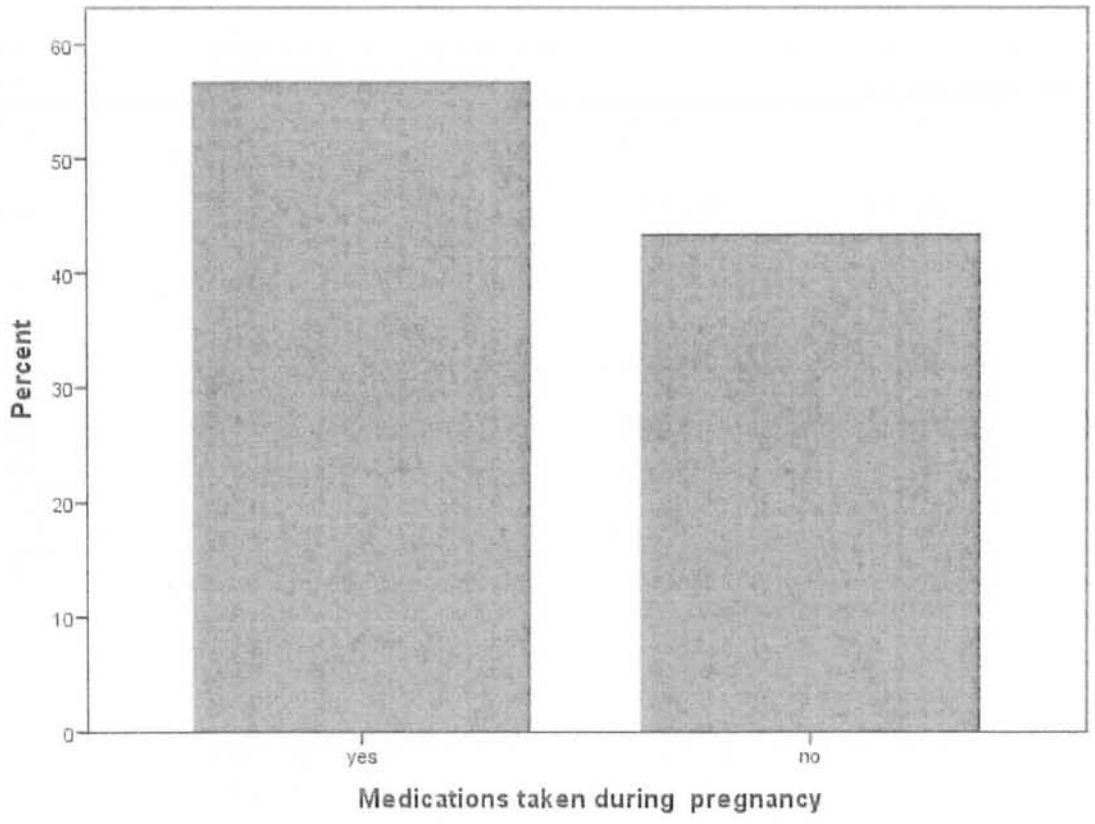

Figure 16. Mother Taking Any Medication During Pregnancy

Figure 16 illustrates percentages of mother taking any medication during pregnancy. Most of the mothers (56.7%) reported that they had taking any medication during pregnancy where as 43.3% reported that they had not taking medication during pregnancy.

Table 17

Percentage Showing Mother Experienced Any Labor or Delivery Problems (N = 60)

	Frequency	%
Caesarian	31	51.7
Normal delivery	12	20
Labor induced	17	28.3

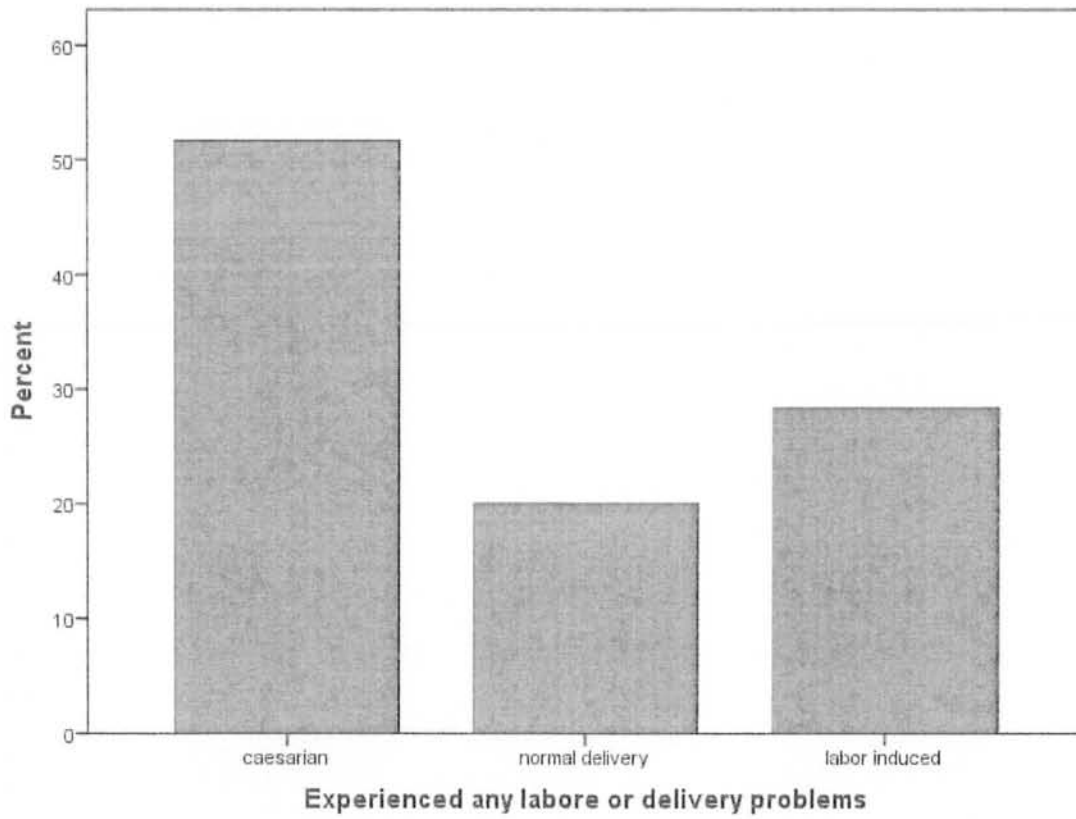

Figure 17. Mothers Experienced Any Labor or Delivery Problems

Figure 17 illustrates percentages of mothers experienced any labor or delivery problems. Most of the mothers (51.7%) reported that they had experienced Caesarian. Moreover, 20% reported that they had normal delivery and 28.3% reported that they had experienced labor induced.

Table 18

Percentage Showing Maternal Metabolic Condition (Diabetes, Hypertension nd Obesity) During Pregnancy (N = 60)

	Frequency	%
Yes	50	83.3
No	10	16.7

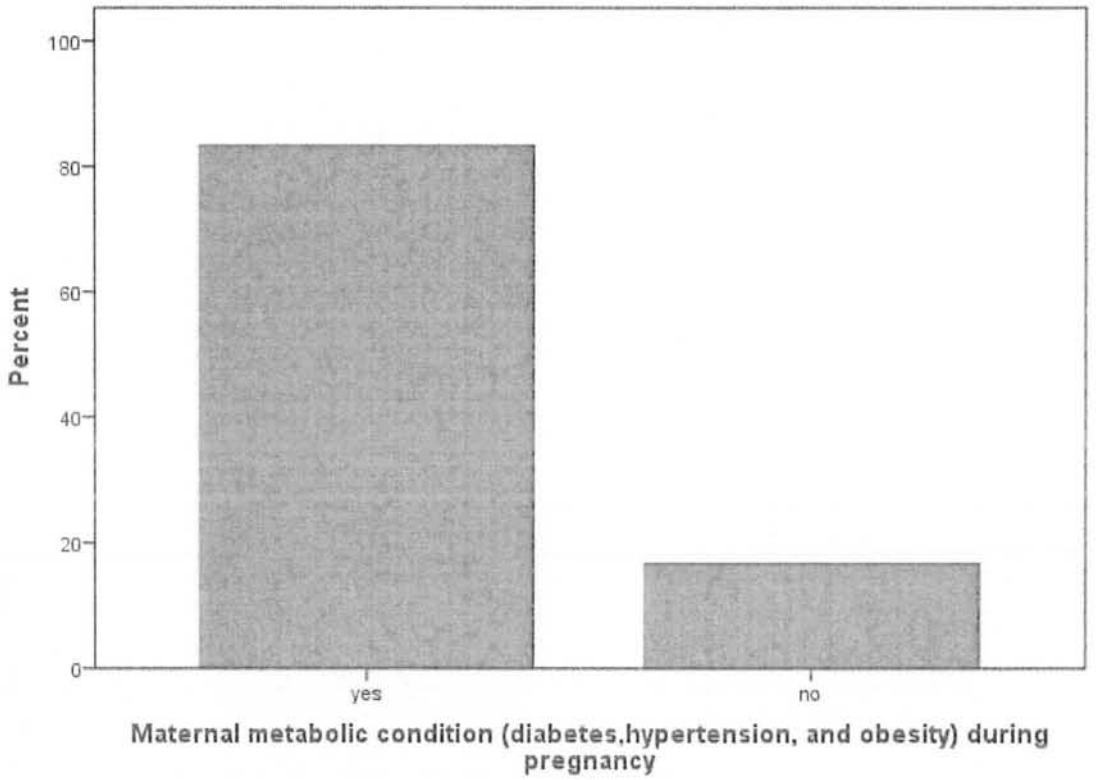

Figure 18. Maternal Metabolic Condition During Pregnancy

Figure 18 illustrates percentages of maternal metabolic condition during pregnancy. Most of the mothers (83.3%) reported that they had diabetes, Hypertension and overweightness during pregnancy and 16.7% reported that they had not diabetes, Hypertension and overweightness during pregnancy.

Table 19

Percentage Showing That Mother Have Any Vaccinations During the Pregnancy (N = 60)

	Frequency	%
Yes	16	26.7
No	44	73.3

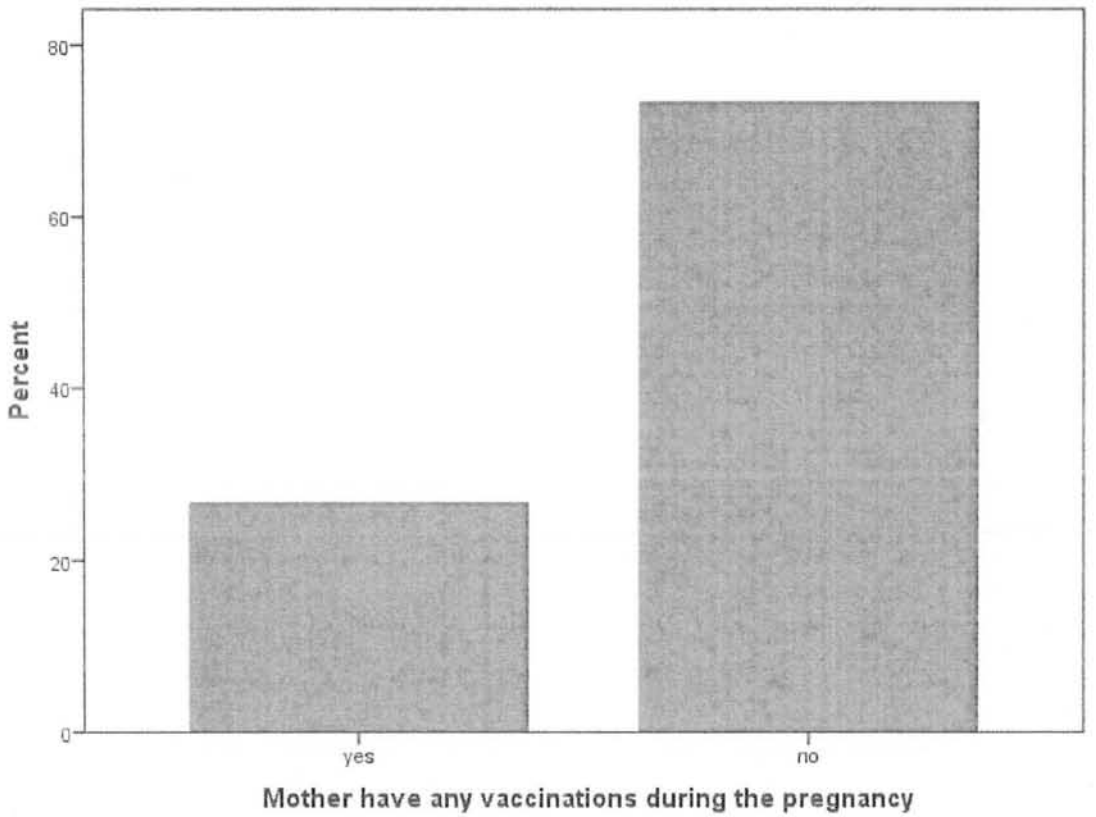

Figure 19. Mothers have any Vaccinations During Pregnancy

Figure 19 illustrates percentages of mothers have any vaccinations during pregnancy. As reported by mothers, 26.7% reported that they had vaccinations during the pregnancy and most of the mothers (73.3%) reported that had not any vaccinations during pregnancy.

Table 20

Percentage Showing Infection Requiring Antibiotics (N = 60)

	Frequency	%
Yes	39	65.0
No	21	35.0

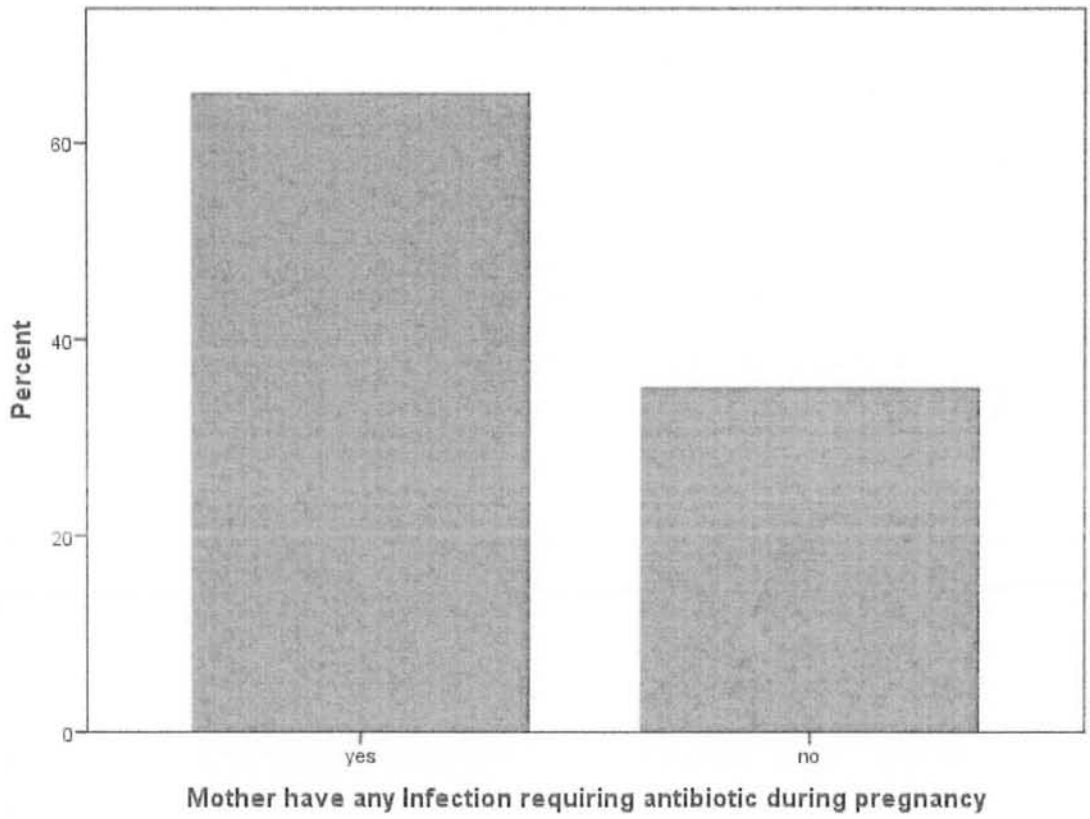

Figure 20. Mothers Suffering from Infections Requiring Antibiotics During Pregnancy

Figure 20 illustrates percentages of mothers suffering from infections requiring antibiotics during pregnancy. Most of the mothers (65%) reported that they were suffering from infections requiring antibiotics during pregnancy. Moreover, 35% reported that they did not suffering from any kind of infections requiring antibiotics during pregnancy. As reported by mothers, 48.3% reported that they were suffering from infections requiring antibiotics in 1st trimester, 10% reported that they were suffering infections requiring antibiotics in 2nd trimester. Whereas 8.3% reported that

they were suffering from infections requiring antibiotics in 3rd trimester. Similarly, 33.3% reported that they didn't know the trimesters at which they are suffering from infections requiring antibiotics

Table 21 (a)

Percentage Showing Viral Illness During Pregnancy (N = 60)

	Frequency	%
Yes	52	86.7
No	3	5
Don't know	5	8.3

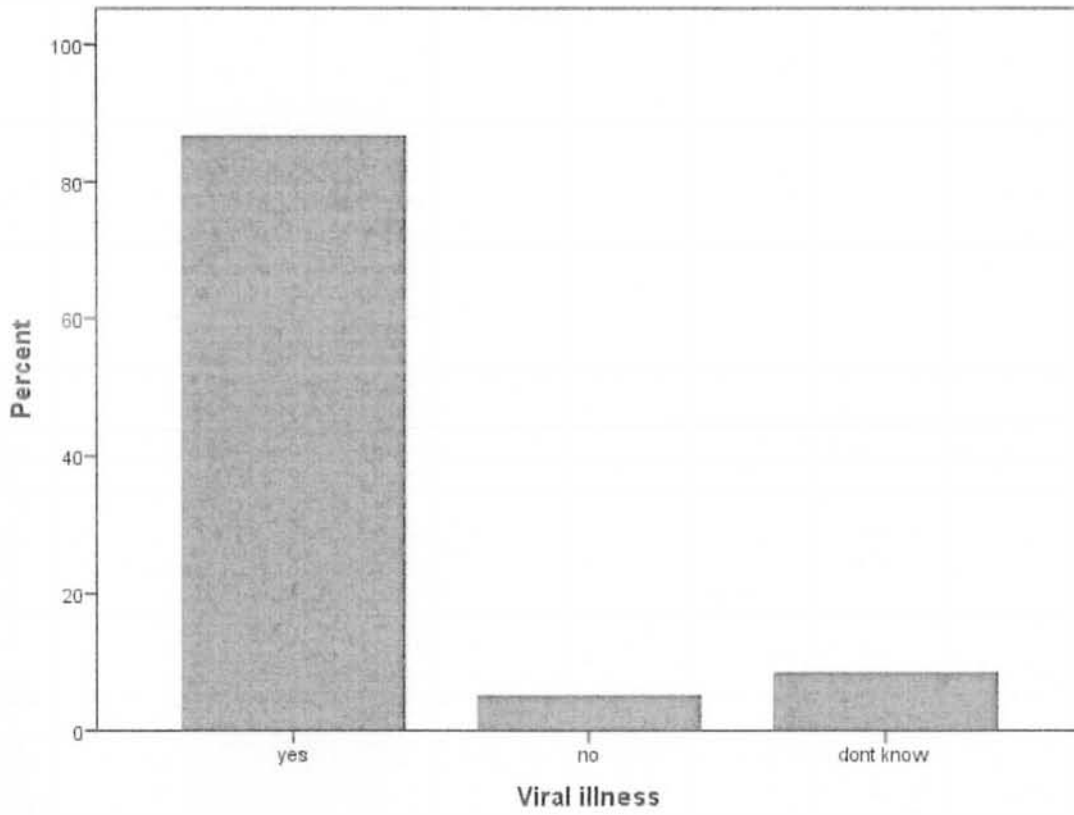

Figure 21 (a). Mothers Suffering from Viral Illness During Pregnancy

Figure 21 (a) illustrates percentages of the mothers suffering from viral illness during pregnancy. Most of the mothers (86.7%) reported that they were suffering from viral illness during pregnancy. Only 5% reported that they did not suffering from viral illness during pregnancy. Moreover, 8.3% reported that they did not remembered.

Table 21 (b)

Percentages Showing Trimester at which Viral Illness occur During Pregnancy (N = 60)

	1st trimester (%)	2nd trimester	3rd trimester
Cold	11.7	1.7	51.7
Influenza	23.3	63.3	5
Rubella	6.7	3.3	1.7
Measles	1.7	8.3	1.7
Mumps	1.7	8.3	1.7
Seizures	6.7	3.3	1.7

Table 21 (b) illustrates percentages of trimester at which viral illness occur during pregnancy. As reported by mothers 11.7% reported that they were suffering from cold during pregnancy in 1st trimester. 1.7% of the mothers reported that they were suffering from cold during pregnancy in 2nd trimester. 51.7% reported that they were suffering from cold during pregnancy in 3rd trimester and 35% of the mothers did not remembered. Whereas 23.3% of the mothers reported that they were suffering from influenza during pregnancy in 1st trimester. 63.3% of the mothers reported that they were suffering from influenza during pregnancy in 2nd trimester, 5% of the mothers reported that they were suffering from influenza during pregnancy in 3rd trimester and 8.3% of the mothers did not remembered. Similarly, 1.7% of the mothers reported that they were suffering from measles during pregnancy in 1st trimester. 8.3% of the mothers reported that they were suffering from measles during pregnancy in 2nd trimester. Only 1.7% of the mothers reported that they were suffering from measles during pregnancy in 3rd trimester and 88.3% of the mothers did not remembered. 1.7% of the mothers reported that they were suffering from mumps during pregnancy in 1st trimester, 8.3% of the mothers reported that they were suffering from mumps during pregnancy in 2nd trimester. 1.7% of the mothers reported that they were suffering from mumps during pregnancy in 3rd trimester and 88.3% of the mothers did not remembered. Most of the mothers (60%) reported that they were suffering from rubella during pregnancy in 1st trimester, 15% of the

mothers reported that they were suffering from rubella during pregnancy in 2nd trimester. 25% of the mothers reported that they were suffering from rubella during pregnancy in 3rd trimester and 60% of the mothers did not remembered. Moreover, 6.7% of the mothers reported that they were suffering from seizures during pregnancy in 1st trimester. 5.5% of the mothers reported that they were suffering from seizures during pregnancy in 2nd trimester and 1.7% of the mothers reported that they were suffering from seizures during pregnancy in 3rd trimester.

Table 22 (a)

Percentage Showing Mother have Diabetes During Pregnancy (N = 60)

	Frequency	%
Yes	52	86.7
No	8	13.3

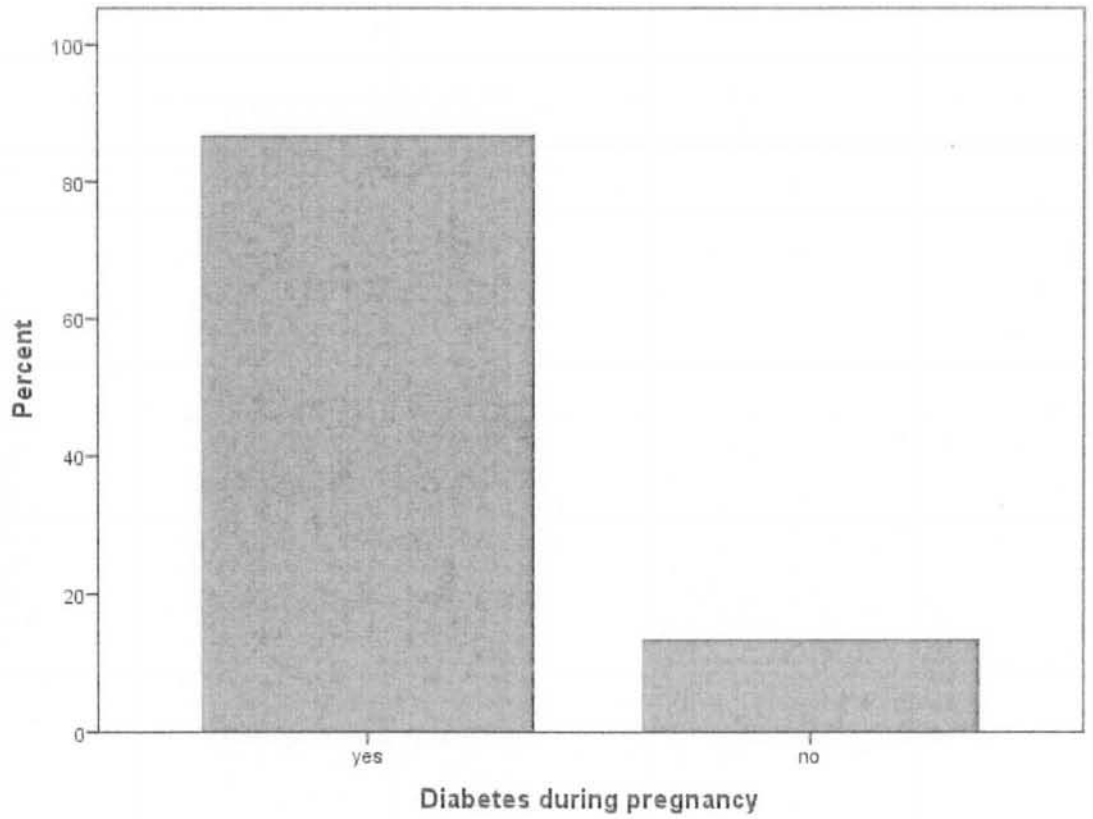

Figure 22 (a). Mothers had Diabetes During Pregnancy

Figure 22 (a) illustrates percentges of mothers had diabetes during pregnancy. Most of the mothers (86.7%) reported that they had diabtetes during pregnancy and 13.3% reported that they had not diabtetes during pregnancy.

Table 22 (b)

Percentages Showing any Medication Taken by Mother for Diabetes During Pregnancy (N = 60)

	Frequency	%
Yes	27	45.0
No	28	46.7
Don't know	5	8.3

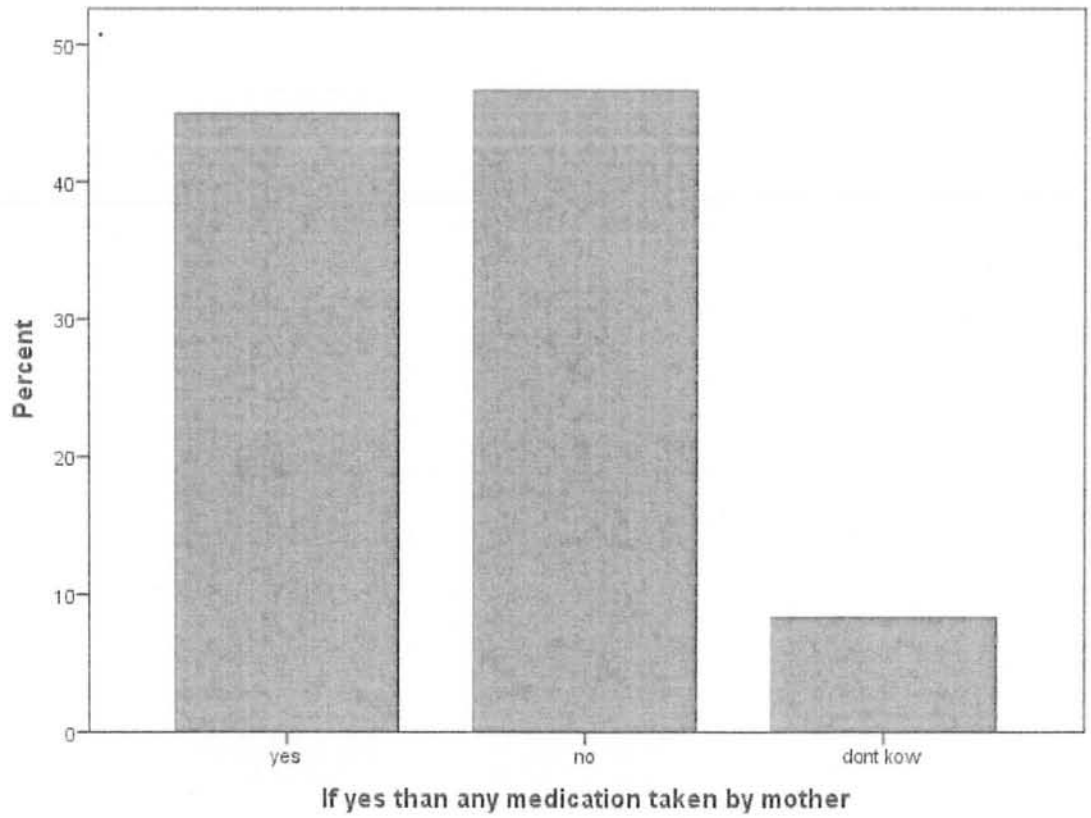

Figure 22 (b). Medication Taken by Mothers for Diabetes

Figure 22 (b) illustrates percentages of the medication taken by mothers for diabetes. As reported by mothers, 45% reported that they were taking medication for

diabetes during pregnancy, whereas 46.7% reported that they were not taking medication for diabetes during pregnancy moreover, 8.3% reported that they did not remembered.

Table 22 (c)

Percentages Showing Insulin Is Taken by Mother for Diabetes During Pregnancy (N = 60)

	Frequency	%
Yes	17	28.3
No	42	70.0

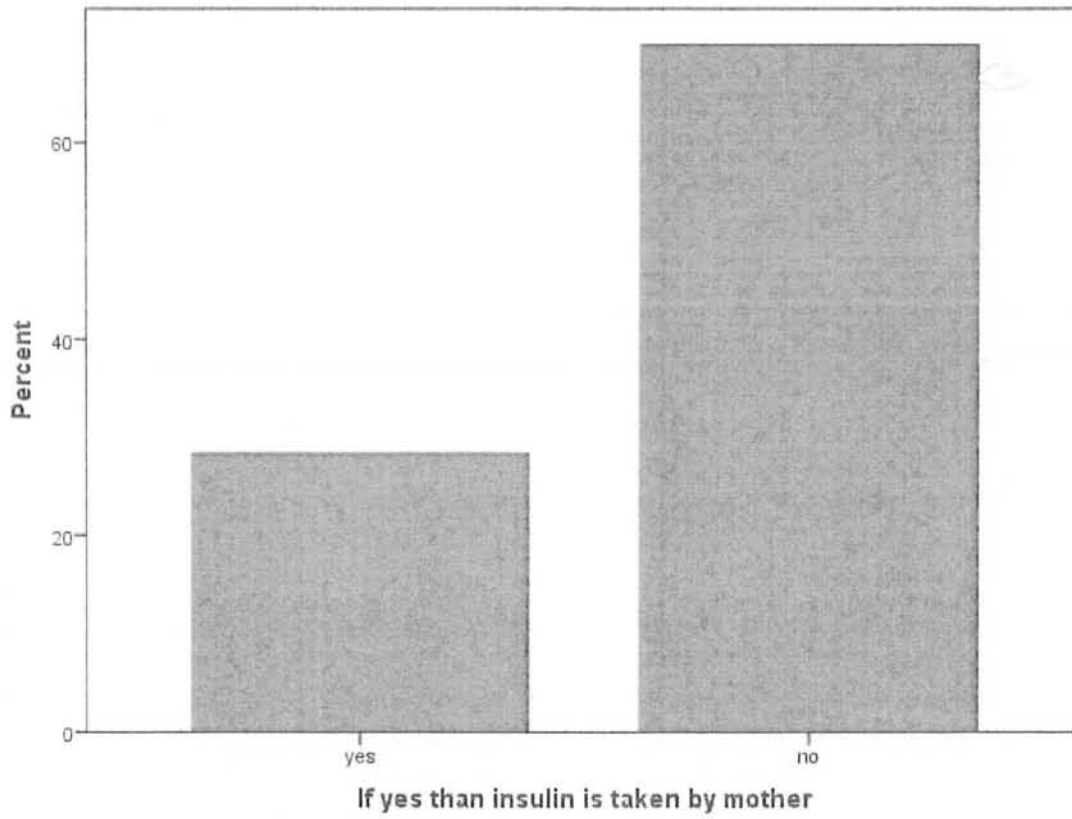

Figure 22 (c). Mothers had Taking Insulin for Diabetes During Pregnancy

Figure 22 (c) illustrates percentages of mothers had taking insulin for diabetes during pregnancy. As reported by mothers, 28.3% reported that they were taking insulin for diabetes during pregnancy and most of the mothers(70%)reported that they were not taking insulin for diabetes during pregnancy.

Table 23 (a)

Percentages Showing Hypertension (High Blood Pressure) During Pregnancy (N = 60)

	Frequency	%
Yes	56	93.3
No	4	6.7

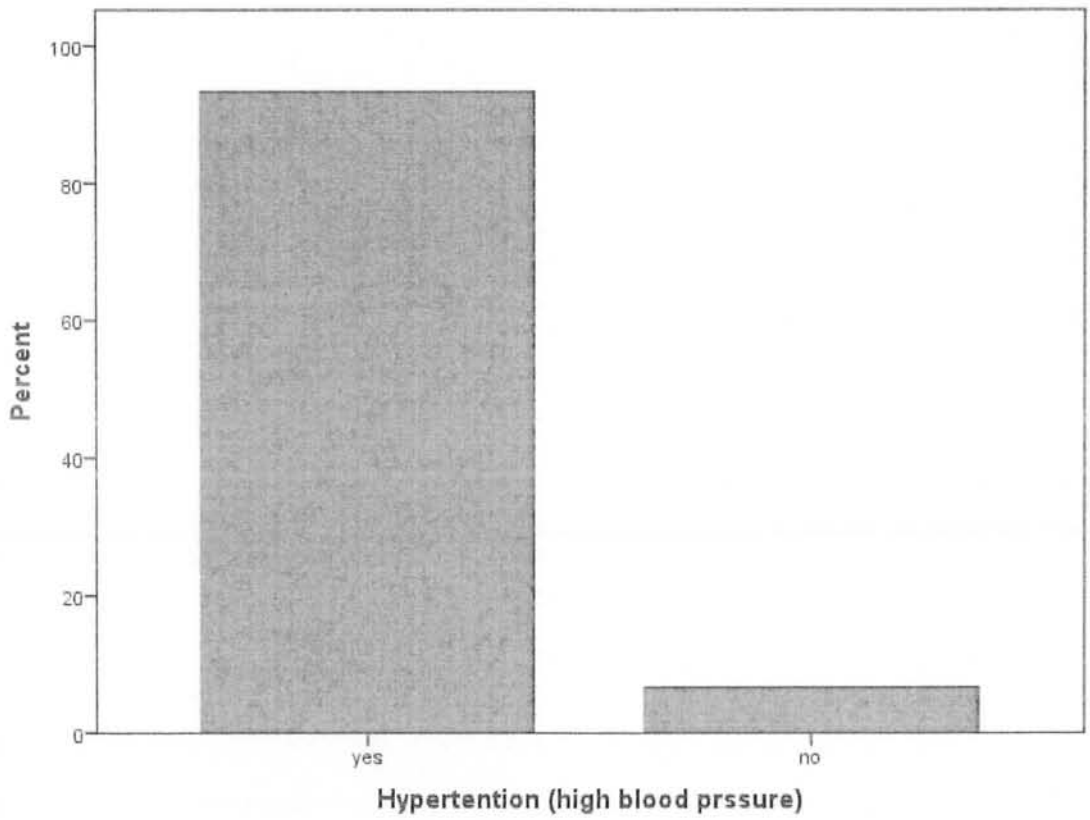

Figure 23 (a). Mother's Hypertension (High Blood Pressure) During Pregnancy

Figure 23 (a) illustrates percentages of mother's hypertension (high blood pressure) during pregnancy. Most of the mothers, 93.3% reported that they had high blood pressure during pregnancy and 6.7% reported that they did not have high blood pressure during pregnancy.

Table 23 (b)

Percentages Showing Hypertension was Treated with Medication During Pregnancy (N = 60)

	Frequency	%
Yes	10	16.7
No	44	73.3

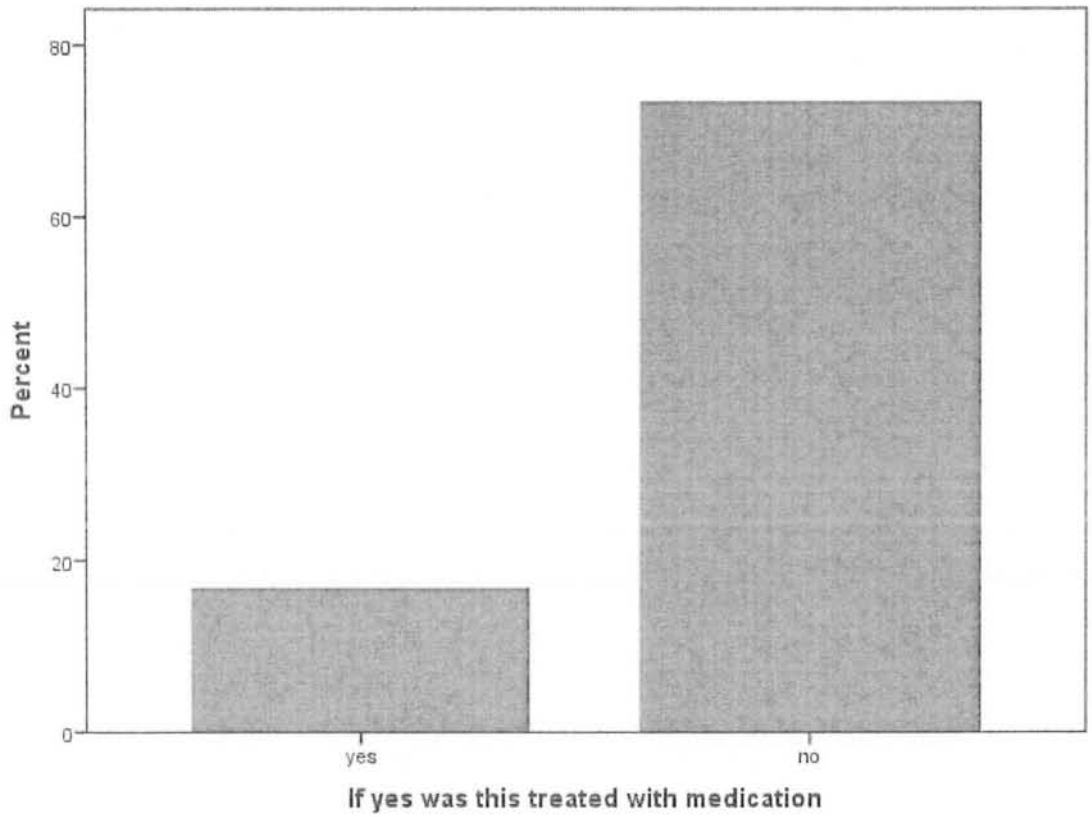

Figure 23 (b). Mother's Hypertension Was Treated with Medication During Pregnancy

Figure 23 (b) illustrates percentages of mother's hypertension was treated with medication during pregnancy. As reported by mothers, 16.7% reported that they were treated with medication during pregnancy but most of the mothers (73.3%) reported that they did not treated with medication during pregnancy.

Table 24

Percentages Showing Preterm Labor Requiring Treatment (Bed Rest Or Medication) (N = 60)

	Frequency	%
Yes	32	53.3
No	27	45

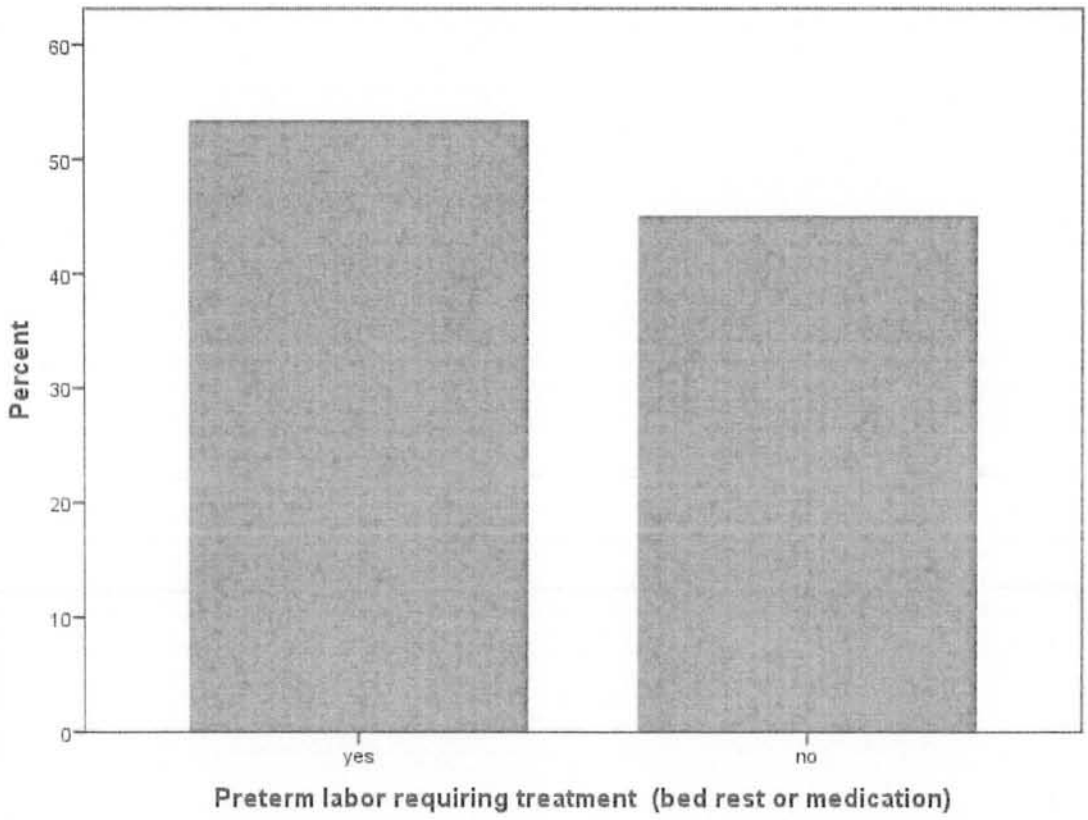

Figure 24. Preterm Labor Requiring Treatment (Bed Rest or Medication)

Figure 24 illustrates percentages of preterm labor requiring treatment (bed rest or medication). Most of the mothers (53.3%) reported that they had preterm labor requiring treatment (bed rest or medication) during pregnancy where as 45% of the mother had not preterm labor requiring treatment (bed rest or medication) during pregnancy.

Table 25

Percentages Showing other Major Illness or Injury During Pregnancy (N = 60)

	Frequency	%
Yes	50	83.3
No	10	16.7

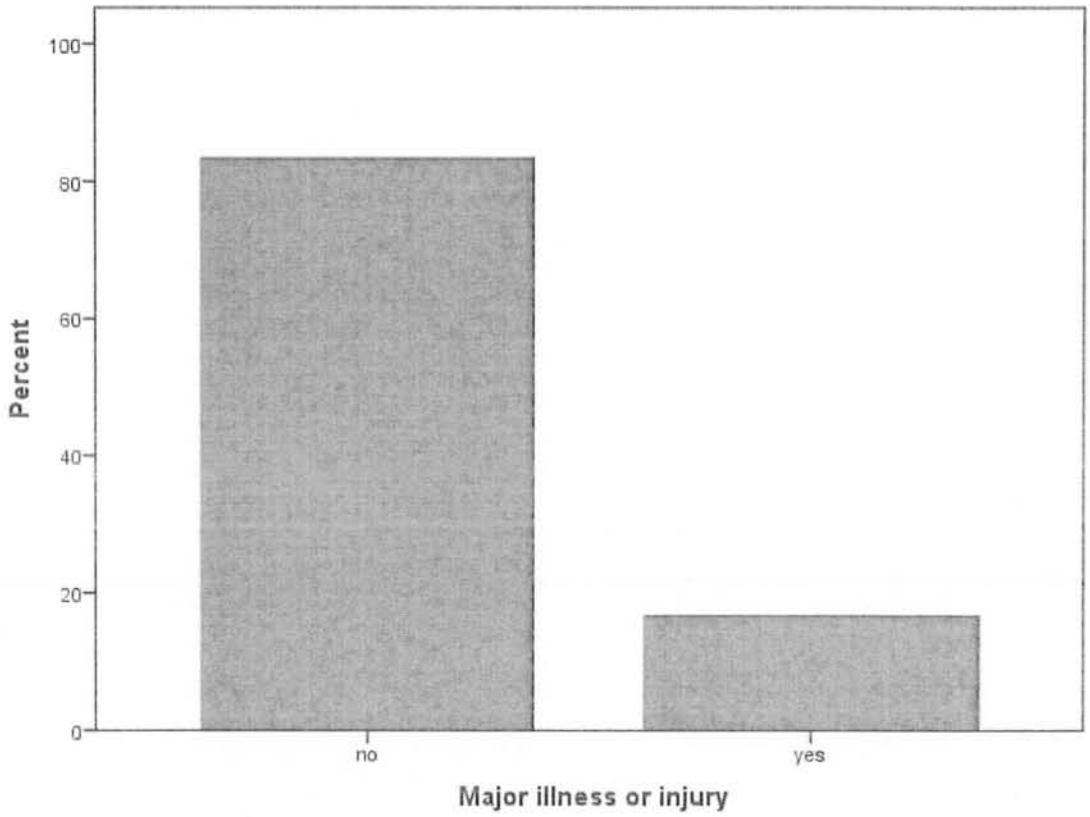

Figure 25. Major Illness or Injury During Pregnancy

Figure 25 illustrates percentages of major illness or injury during pregnancy. Most of the mothers (83.3%) reported that they had major illness or injury during pregnancy and only 16.7% reported that they had no major illness or injury during pregnancy.

Table 26 (a)

Percentages Showing Mother's Taking Prenatal Vitamin During Pregnancy (N = 60)

	Frequency	%
Yes	17	28.3
No	43	71.7

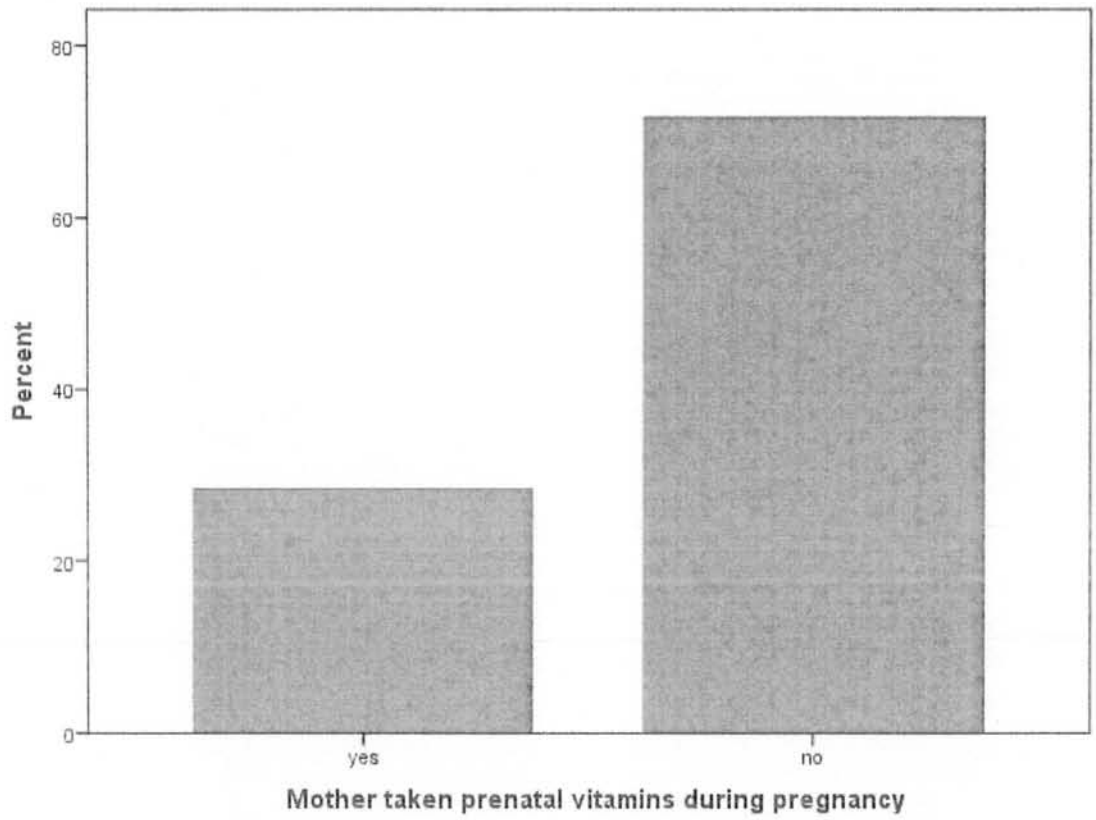

Figure 26 (a). Mothers Taking Prenatal Vitamin During Pregnancy

Figure 26 (a) illustrates percentages of mothers taking prenatal vitamin during pregnancy. As reported by mothers, 28.3% reported that they were taking prenatal vitamin during pregnancy but most of the mothers (71.7%) reported that they did not taking prenatal vitamins during pregnancy.

Table 26 (b)

Percentage Showing the Trimester in Which Mother's Taking Prenatal Vitamins During Pregnancy (N = 60)

	Frequency	%
1st trimester	16	26.7
2nd trimester	1	1.7
Don't know	43	71.7

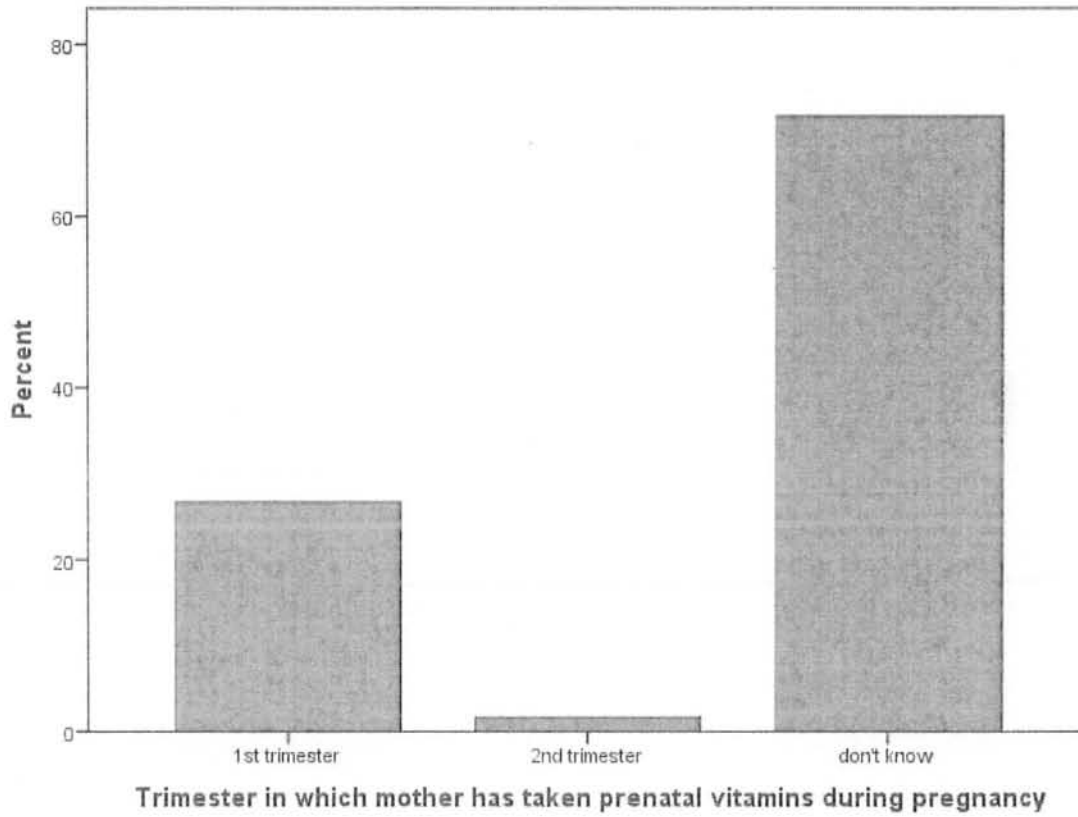

Figure 26 (b). Trimesters in which Mother's Taking Prenatal Vitamins During Prgnancy

Figure 26 (b) illustrates percentages of trimesters in which mother's taking prenatal vitamins during prgnancy. As reported by mothers, 26.7% reported that they were taking prenatal vitamins during pregnancy in 1st trimester, 1.7% reported that they were taking prenatal vitamins during pregnancy in 2nd trimester and most of the mothers (71.7%) reported that they did not remembered.

Table 27

Percentage Showing Mother's Taking Nutritional Supplements During Pregnancy (N = 60)

	Frequency	%
Yes	19	31.7
No	41	68.3

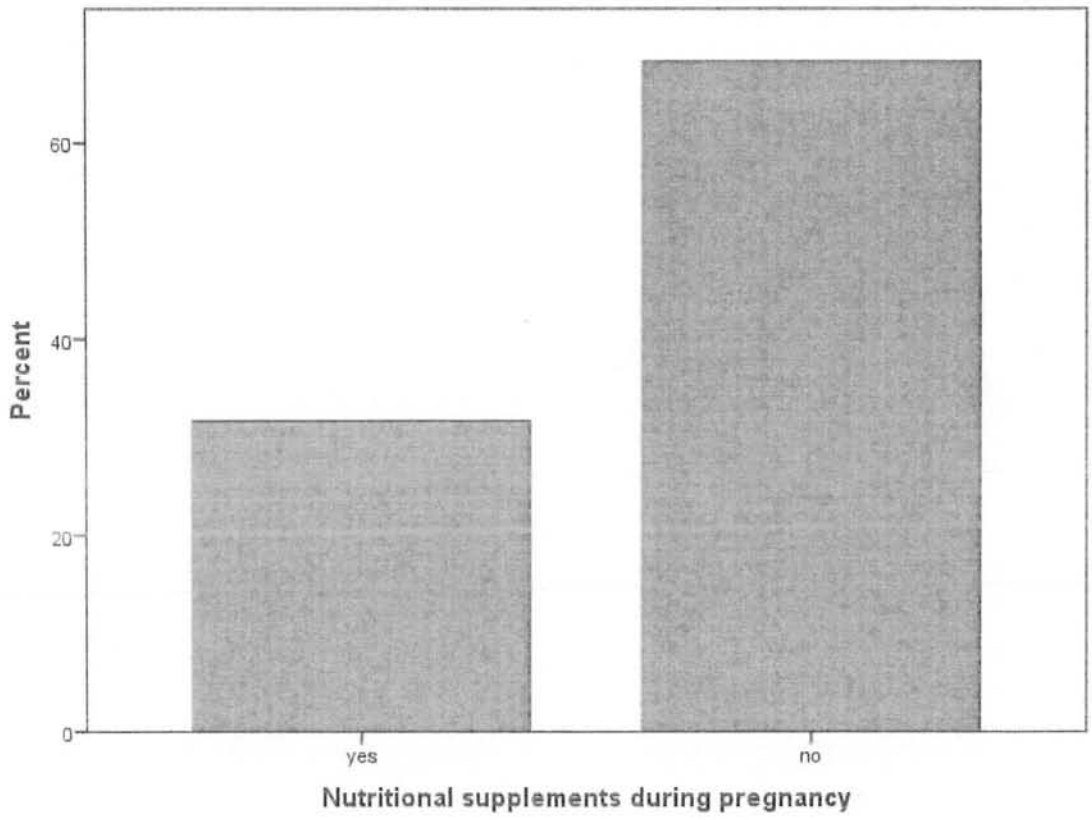

Figure 27. Mother's Taking Nutritional Supplements During Pregnancy

Figure 27 illustrates percentages of mother's taking nutritional supplements during pregnancy. As reported by mothers, 31.7% reported that they were taking nutritional supplements (Protein, Folic acid, calcium and vitamins) during pregnancy whereas most of the mothers (68.3%) reported that they did not taking nutritional supplements during pregnancy.

Table 28

Percentages Showing Pesticides Exposure During Pregnancy (N = 60)

	Frequency	%
Yes	47	78.3
No	8	13.3

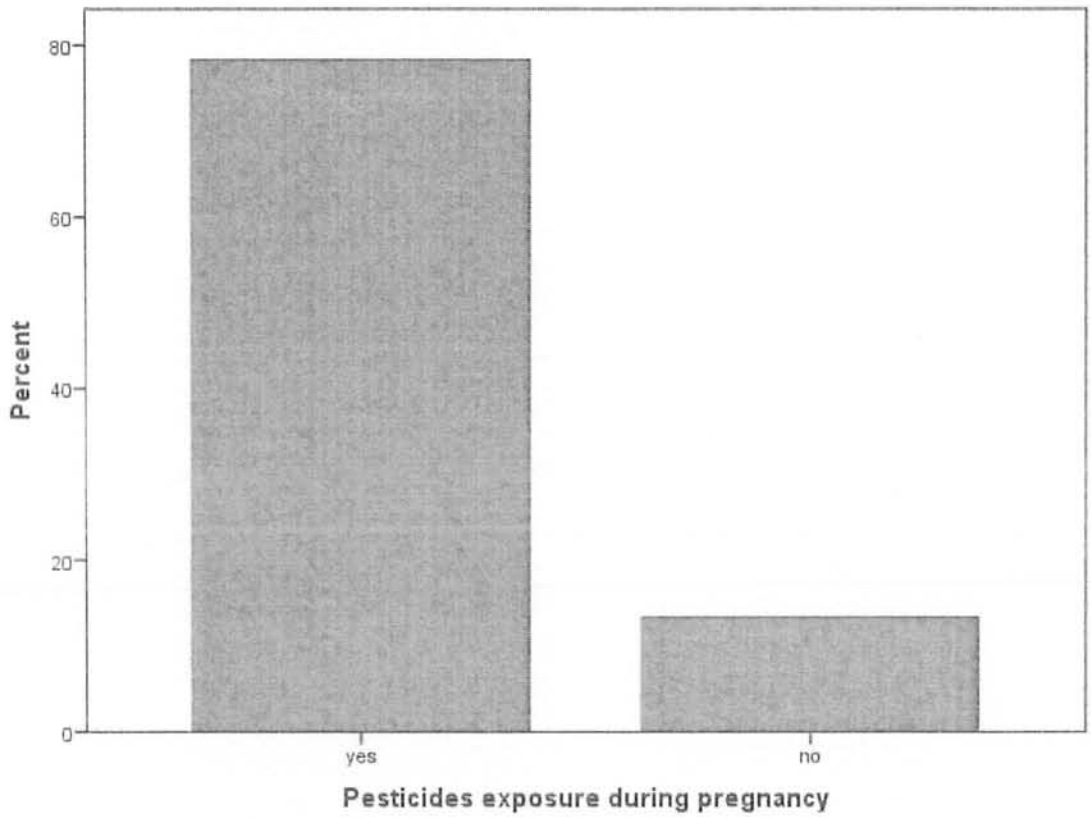

Figure 28. Pesticides Exposure During Pregnancy

Figure 28 illustrates percentages of pesticides exposure during pregnancy. Most of the mothers (78.3%) reported that they had exposure to pesticides during pregnancy but only 13.3% reported that they had no exposure to pesticides during pregnancy

Family Related Risk Factors for Autism Spectrum Disorder

Table 29

Percentage Showing Family History of Mental Health Problems (N = 60)

	Frequency	%
Emotional and Behavioral problems	6	10
Intellectual Disability	2	3.3
Mental illness and Drug abuse	3	5
Learning disability	2	3.3
Emotional problems	10	16.7
Emotional problems and Drug abuse	3	5
Schizophrenia	7	11.7
Schizophrenia and Emotional problems	11	18.3
None of these	16	26.7

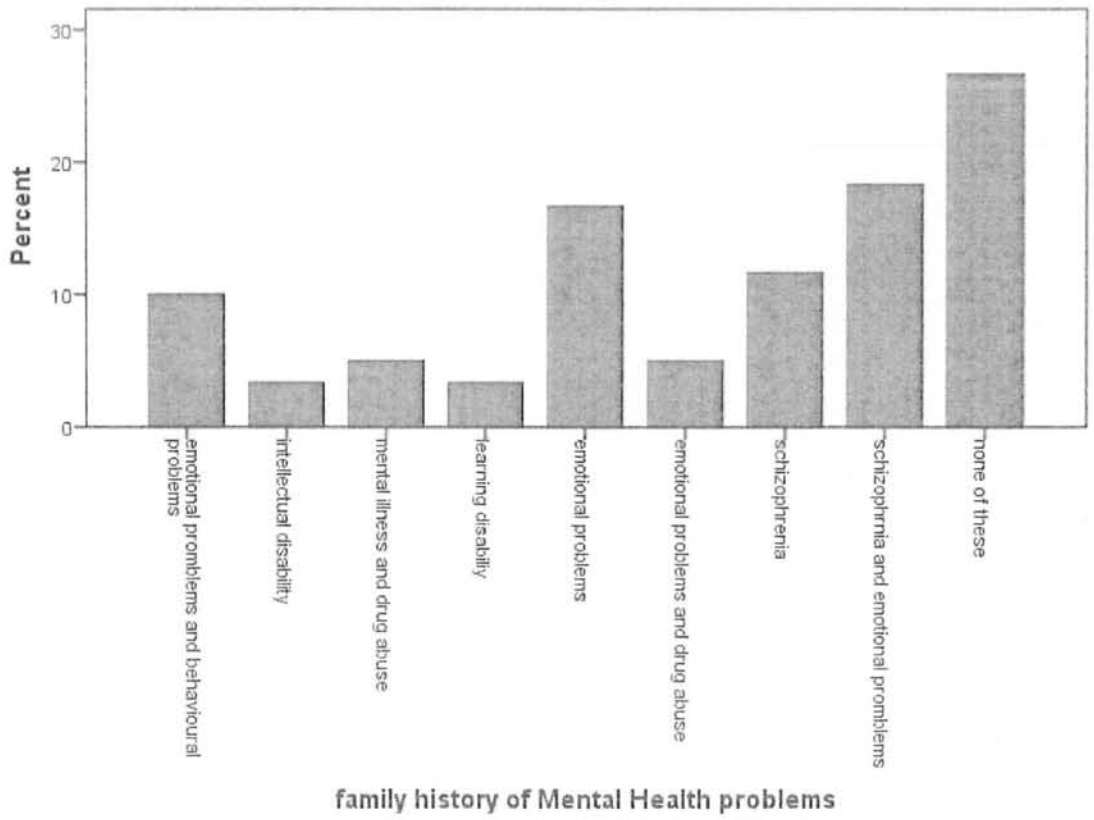

Figure 29. Family History of Mental Health Problems

Figure 29 illustrates percentages of family history of mental health problems. As reported by mothers, 10% reported that their family had Emotional and Behavioural problems, 3.3% reported that their family had Mental retardation, 5% reported that their family had Mental illness and Drug abuse, 3.3% reported that their family had Learning disability problem, 16.7% reported that their family had Emotional problems, 5% reported that their family had Emotional problems and Drug abuse, 11.7% reported that their family had Schizophrenia, 18.7% reported that their family had Schizophrenia and Emotional problems but most of the mothers (26.7%) reported that their family had no problem.

Table 30

Percentages Showing the Siblings Diagnosed With Autism (N = 60)

	Frequency	%
Yes	8	13.3
No	85	86.7

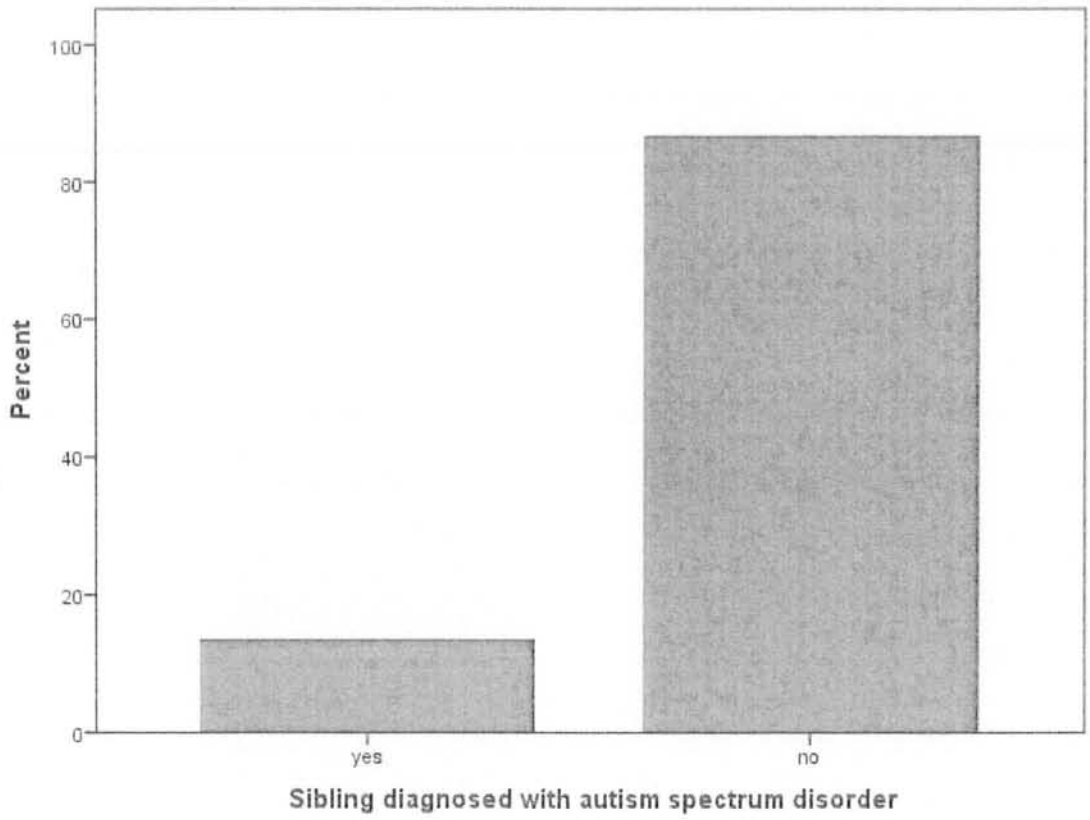

Figure 30. Siblings Diagnosed with Autism

Figure 30 illustrates percentages of siblings diagnosed with Autism. As reported by mothers 13.3% of the siblings were diagnosed with Autism but most of the mothers (86.7%) reported that siblings were not diagnosed with it.

DISCUSSION

Chapter 4

DISCUSSION

The purpose of this research is to explore the Risk Factors for Autism Spectrum Disorder. Moreover, to observe four main risk factors (medical, developmental, prenatal and family related risk factors) which were identified through literature and interview from experts. Medical risk factors like high fever, jaundice, lack of oxygen at the time of birth and taking medication (Allopathic and Homeopathic), major accidents or injuries etc.), Developmental risk factors include (child began to do the following activities such as sit, stand, walk, feed self, dress self-etc., child is toilet trained or not and sleeping difficulties in children etc.), Prenatal risk factors include (mother experienced any kind of stress during pregnancy, cousin marriages, mothers conditions during pregnancy, medication taking during pregnancy, maternal metabolic condition, mother have any vaccination during pregnancy, viral illness, infection requiring antibiotics, taking nutritional supplements during pregnancy and pesticides exposure during pregnancy). And family related risk factors for autism.

The instruments included demographic sheet, risk factor of autism checklist was used to assess risk factors of autism and Gilliam Autism Rating Scale–Second Edition (GARS-2) was used screen the children with Autism Spectrum Disorder.

The current study, Data has been collected by non-probability purposive sampling technique from mothers of children with autism found in Islamabad and Rawalpindi. To achieve the aims of the current research, appropriate statistical analyses stood used toward analyze data. Descriptive statistic mostly frequency and percentages were computed for all the measures in the study in order to examine the overall trend to data. Sample comprised of children (53.3%) with autism between the age 2-8 years whereas 41.7% of the children with autism between the age 9-15 years. Moreover, 5% sample comprised of children with autism between the age 16-21 years. Percentage of gender is 60 % are boys and 40 % are girls. Boys has more prone for autism than girls' previous findings also support this finding, 90 % of the children diagnosed with autism acknowledge from the experts where only 4 cases diagnosed with autism having comorbidity (Cerebral palsy, Down Syndrome, Fits

problem, Mentally Retarded) (Tsai, Stewart, & August,1981; Van Wijngaarden-Cremers et all., 2014)

Data was analyzed in four main Risk Domains, which we had identified through literature, the domains are Medical, Developmental, Prenatal and family related Risk factors of autism Spectrum Disorder.

Medical Risk Factors for Autism

In this domain the following medical risk factors were assessed.

At the age when the problem was first noticed by parent. Most of the mothers (83.3 %) reported that they first identified the problem in their children between age range 1-5 years. whereas 16.4% reported that they first noticed the problem in their children between age range 6-10 years *(see figure 1a)*. 90% mothers reported that their children diagnosed with Autism acknowledge from the experts only 4 cases having comorbidity (Cerebral palsy, Down Syndrome, Fits problem, Mentally Retarded*) (see figure 1b)*. 79 % were diagnosed between 1-5 years. Whereas 20.3 % reported that their children were diagnosed at the age between 6-10 *(see figure 1c)* years because of lack of awareness and acceptance late diagnosis and early intervention occur.

As reported by mothers that the medical conditions experienced by children after birth. Most of the Mothers reported that 38.3% of their children were suffer from Jaundice, influenza, lack of oxygen (at the time of birth), pneumonia and high fever only while as only 1.7% of the children were not suffer from any of illness *(see figure 2a*). Figure 2(b) demonstrates the ages the children experienced the medical condition after birth most of the mothers (26.2%) reported that their children suffer from medical conditions in 2 years, but only 3.3% of the children suffer from medical conditions in 4 and 5 years. Most of the mothers reported that the weight of their children was 2-3 pounds at the time of birth *(see figure 3)*

Results *(Figure 4)* demonstrates major accident or hospitalization of the children after birth. Most of the mothers (63.3%) reported that their children had not been major accident or hospitalization after birth. Moreover 36.7% of the children had been hospitalized or major accident.

55% of the mothers reported that their children taking both homeopathic and allopathic medicines only 8.3% reported that their children taking allopathic medicines where as 36.7% of the children taking homeopathic medicines *(see figure 5a)*. as reported by mothers 95% of the children not showing negative reactions to medications whereas 5% reported that their children showing negative reactions to *medications (see figure 5b).*

Results *(Figure 6)* demonstrates the children that has been taken to spiritual Healer. Most of the mother (91.7%) reported that their children were taken to spiritual Healer whereas only 8.3% reported that their children were not taken to spiritual Healer.

Developmental Risk Factors for Autism

As reported by mothers the children started to do the subsequent actions (Crawl sit, stand, speech walk, feed self and dress self) most of the mothers (43.3%) reported that their children had achieve their miles stone on time. Similarly, 56.7% reported that their children were delayed in subsequent actions (Crawl sit, stand, speech walk, feed self and dress self).

Results *(Figure 2a)* demonstrates whether the child is toilet trained or not. Most of the mothers (63.3%) stated that their offspring were not toilet trained and 36.7% stated that their offspring were not toilet trained. only 13.3% stated that their offspring were toilet trained in 6-10 years whereas 63.3% of the female parents stated that their offspring were not toiled trained (*see figure 2b).* Previous researches also support the findings that toileting problems often present with individuals with autism (Dalrymple, & Ruble, 1992).

Results *(Figure 3)* demonstrates sleep difficulties in children. Most of the mothers (75%) reported that their children having sleep difficulties only 25% reported that their children having sleep difficulties. Pervious literature also supports the findings that sleep difficulties has been reported to be associated with Autism. Hereditary irregularities and ecological aspects might affect melatonin fusion. Melatonin controls the circadian beat, is an antioxidant, and it is involved in an intricate in the immune response, and controls synaptic malleability (Feng et al., 2012; Rossignol & Frye, 2011).

Prenatal Risk Factors for Autism

Results *(Figure 1)* demonstrates was the pregnancy planned. Most of the mothers (68.9%) reported that their pregnancy was planned where as 29.5% reported that their pregnancy was not planned.

Results *(Figure 2)* demonstrates mother experienced any kind of stress during pregnancy. As reported by mothers only 8.3% of the mothers did not experienced any kind of stress during pregnancy but most of the mothers (91.7%) reported that they experienced stress during pregnancy. It is evident by findings of previous researchers found that prenatal stress has already been stated to be related with Autism. In creatures other than the human beings, irrespective of the exact prenatal stressor being cast-off, prenatal pressure triggered the HPA (hypothalamic-pituitary-adrenal) alliance triggering irregularities in postnatal immune occupation. (Limperopoulos et al., 2007; Kinney et al., 2008; Ward, 1990).

Results *(Figure 3)* demonstrates both mother and father cousins to each other (cousin marriage). As reported by mothers 85% of the mothers and fathers are cousin to each other but only 15% reported that the mothers and fathers are not cousin to each other. Cousin marriage has been associated with autism. Previous researches also support the findings. That cousin marriages can be cause of autism (Morrow, 2008; Hamamy, 2012)

Results *(Figure 4)* illustrates the season of conception of the baby. Most of the mothers (46.7%) reported that they conceived their baby in winter season where as 8.3% reported that they conceived their baby in summer. Only 5% reported that they conceived their baby in spring season. Previous literature supports that season of conception (winter and summer) has been associated with risk factors for autism (Zerbo, Iosif, Delwiche, Walker, & Hertz-Picciotto, 2011).

Results *(Figure 5)* demonstrates the mother's condition during pregnancy. As reported by mothers 46.7% had fever and diabetes during pregnancy, According to Zerbo et al., (2012) fever during pregnancy was associated with autism. 23.3% reported that they had fever, diabetes and over age (over 35 during pregnancy). Similarly, 13.3% reported that they had fever during pregnancy, 6.7% reported that they had fever, diabetes and under age (under17 during pregnancy), According to Krakowiak et al., (2012) diabetes has been associated with autism. 3.3% was over age

(over 35 during pregnancy), 1.7% reported that they had diabetes during pregnancy, 1.7% reported that they had fever and over age (over 35 during pregnancy) and only 3.3% reported that they had no problem during pregnancy.

Results *(Figure 6)* demonstrates the mother taking any medications during pregnancy. Most of the mothers (56.7%) reported that they had taking any medications during pregnancy. Mother taking any medications during pregnancy has related by risk of autism (Krakowiak.,2012; Zerbo ., 2012; Schmidt, Hansen & Hertz-Picciottom, 2011) Moreover, 43.3% reported that they had not taking any medications during pregnancy.

51.7% of the mothers reported that they had experienced Caesarian section where as 28.3% reported that they had labor induced experienced. Moreover 20% of the mothers reported that they had normal delivery *(see figure 7).* Previous letrature also support the findings that the amplified pregnancy complications and maternal autoimmunity has been reported to be associated with autism. (Croen et al., 2007; Shelton et al., 2010; Sandin et al., 2012; Kong et al., 2012; Reichenberg et al., 2010; Buizer-Voskamp et al., 2011; Grether et al., 2009; Gardener et al., 2009).

83.3% of the mothers reported that they have meta-bolic situations (diabetes, Hypertension and overweightness) when they were pregnant whereas only 16.7% reported that they had no diabetes, hypertension and o*besity (see figure 8).* Overweightness and diabetes happen regularly in female parents compared to that of male parents in Autism cases. Previous literature also supports the findings that the Diabetes, Hypertension and obesity in the female parent throughout pregnancy tends to a double increased risk for autism. (Gardener et al., 2009; Krakowiak et al., 2012).

26.7% of the mothers reported that they took vaccinations during pregnancy but most of the mothers did not know the name of vaccination they took during pregnancy. Similarly, 73.3% of the mothers reported that they took no vaccinations during pregnancy *(see figure 9).* Vaccination during pregnancy reduced the danger aspects for autism. Most of the mother reported that they did not took vaccination during pregnancy. Previous researches also support the findings that vaccination during pregnancy can reduced the risk factors for autism (Krause, Gershwin, & Shoenfeld 2002).

As reported by mothers 65% of the mothers suffering from infections requiring antibiotics during pregnancy where as 35% reported that they did not suffering from any kind of infections requiring antibiotics during pregnancy. It is evident by findings of previous researchers found that maternal infection has been reported to be associated with Autism. (Anderson et al., 2007; Libbey et al., 2005; Fox et al., 2012; Patterson 2009; Blattner, 1974; Meyer et al., 2007; Miller et al., 2005; Arndt et al., 2005). Motherly contagion, illness, and aversion could change the resistant status of the fetal mind and the particularly fetal immune scheme. 48.3% of mothers suffer from infections requiring antibiotics in 1st trimester, 10% in 2nd trimester and only 8.3% of the mothers in 3rd trimester. *(see figure 10).*

86.7% of the mothers reported that they suffer from viral illness (cold, influenza, measles, mumps, rubella and seizures) during pregnancy only 5% reported that they did not suffering from any viral illness *(see figure 11a)*. previous researchers found that Prenatal viral infection has been reported to be associated with Autism. Parental contagion, autoimmune ailment, or any sort of antipathy might modify the immune working of the fetal mind and the fetal immune arrangement (Anderson et al., 2007; Patterson 2009; Miller et al., 2005; Pardo et al., 2005; Meyer et al., 2007; Blattner, 1974; Arndt et al., 2005). Motherly contagion, autoimmune disease, and aversion could change the immune status of the fetal brain and the fetal immune system in general. As reported by mothers 11.7% reported that they were suffering from cold during pregnancy in 1st trimester. 1.7% of the mothers reported that they were suffering from cold during pregnancy in 2nd trimester. 51.7% reported that they were suffering from cold during pregnancy in 3rd trimester and 35% of the mothers did not remembered. Whereas 23.3% of the mothers reported that they were suffering from influenza during pregnancy in 1st trimester. 63.3% of the mothers reported that they were suffering from influenza during pregnancy in 2nd trimester, 5% of the mothers reported that they were suffering from influenza during pregnancy in 3rd trimester and 8.3% of the mothers did not remembered. Similarly, 1.7% of the mothers reported that they were suffering from measles during pregnancy in 1st trimester. 8.3% of the mothers reported that they were suffering from measles during pregnancy in 2nd trimester. Only 1.7% of the mothers reported that they were suffering from measles during pregnancy in 3rd trimester and 88.3% of the mothers did not remembered. 1.7% of the mothers reported that they were suffering from

mumps during pregnancy in 1st trimester, 8.3% of the mothers reported that they were suffering from mumps during pregnancy in 2nd trimester. 1.7% of the mothers reported that they were suffering from mumps during pregnancy in 3rd trimester and 88.3% of the mothers did not remembered. Most of the mothers (60%) reported that they were suffering from rubella during pregnancy in 1st trimester, 15% of the mothers reported that they were suffering from rubella during pregnancy in 2nd trimester. 25% of the mothers reported that they were suffering from rubella during pregnancy in 3rd trimester and 60% of the mothers did not remembered. Moreover, 6.7% of the mothers reported that they were suffering from seizures during pregnancy in 1st trimester. 5.5% of the mothers reported that they were suffering from seizures during pregnancy in 2nd trimester. 1.7% of the mothers reported that they were suffering from seizures during pregnancy in 3rd trimester and 88.3% of the mothers did not remembered *(see figure 11b)*.

Most of the mothers (86.7) reported that they had diabetes during pregnancy only 13.3% reported that they had no diabetes during pregnancy *(see figure 12a)*. Previous researches also supports the findings that diabetes during pregnancy has been associated with autism (Gardener et al., 2009; Krakowiak et al., 2012). As reported by mothers 45% of the mothers were taking medications for diabetes during pregnancy where as 46.7% reported that they did not taking medications for diabetes during pregnancy. Only 8.3% of the mothers did not remembered *(see figure 12b)*. as reported by mothers 28.3% of the mothers were taking insulin for diabetes during pregnancy where as 70% of the mother was not taking insulin for diabetes during pregnancy *(see figure 12c)*.

Most of the mothers (93.3%) stated that they had extreme blood pressure (hypertension) during pregnancy but only 6.7% reported that they had no high blood pressure during pregnancy *(see figure 13a)*. As reported by the mothers 73.3% of the mothers were not treated high blood pressure with medications during pregnancy. Only 16.7% of the mothers were treated high blood pressure with medications during pregnancy *(see figure 13b)*. Mothers had high blood pressure during pregnancy. Previous researches support the findings that mother hypertension has been associated with autism (Krakowiak et al., 2012).

As reported by mothers 53.3% of the mothers had preterm labor requiring treatment (bed rest or medication) during pregnancy where as 45% of the mothers

reported that they had not preterm labor requiring treatment (bed rest or medication) during pregnancy *(see figure 14).* Most of the mother reported that they had preterm labor. It is evident in previous finding that medication taking during pregnancy can be danger aspect for autism. (Krakowiak et al.,2012; Zerbo et al., 2012; Schmidt, Hansen & Hertz- Picciottom, 2011) Moreover, 43.3% reported that they had not taking any medications during pregnancy.

Most of the mothers (83.3%) reported that they had major illness or injury during pregnancy but only 16.7% reported that they had no major illness or injury during pregnancy *(see figure 15)* (Croen et al., 2007; Kong et al., 2012; Sandin et al., 2012 Parner et al., 2012; Reichenberg et al., 2010; Van Balkom et al., 2012; Grether et al., 2009; Gardener et al., 2009).

Results *(Figure 16)* demonstrates mother's taking prenatal vitamins during pregnancy. Most of the mothers (71.7%) reported that were not taking prenatal vitamins during pregnancy where as 28.3% reported that they were taking prenatal vitamins during pregnancy. As reported by the mothers 26.7% of the mothers taking prenatal vitamins during pregnancy in 1st trimester where as only 1.7% of the mohter taking prenatal vitamins during pregnancy in 2nd trimester and 71.7% of the mother did not remembered *(see figure 15).* Schmidt et al., (2011) determine the association between autism and maternal vitamin addition intake in the preconception periods and interactions effects with practical hereditary alternatives included in one carbon metabolism. Results indicated that maternal vitamin consumption beforehand and during pregnancy may reduce the risk of having offspring with autism.

Results *(Figure 17)* demonstrates mother's taking nutritional supplements during pregnancy most of the mothers reported that 68.3% of the mothers did not taking nutritional supplements during pregnancy. Moreover, 31.7% of the mother taking nutritional supplements (Protein, Folic acid, calcium and vitamins) (DeVilbiss, Gardner, Newschaffer, & Lee, 2015; Schmidt et al., 2011)

Results *(Figure 18)* demonstrates pesticides exposure during pregnancy most of the mothers (78.3%) reported that they had exposure to pesticides during pregnancy. Only 13.3% reported that they had no exposure to pesticides during pregnancy. According to McCanlies et al., (2012) Autism is associated with Parental Occupational Exposure. The occurrence of autism is meaningfully advanced in offspring prenatally uncovered pesticides (valproic acid or thalidomide,

organophosphate and organochlorine) might add to autism. (Gardener et al., 2009; Stromland et al., 1994; Kumar & Chhibber, 2011; Kumar et al., 2010; Szpir, 2006; Dufault et al., 2012; Roberts et al., 2007; Karr et al., 2007; Moore et al.,2000).

As reported by mothers 23% of the mothers and 43.3% of the fathers at time of child's birth was over age (above 35 year of age) during pregnancy. Advanced age in either parent the danger to grow autism is related with. Whereas maximum mutations hoard in the fatherly germline, progressive motherly stage may be adding via different ways for example by amplifying pregnancy problems. (Reichenberg et al., 2010; Grether et al., 2009; Sandin et al., 2012; Van Balkom et al., 2012; Buizer-Voskamp et al., 2011; Parner et al., 2012; Croen et al., 2007; Gardener et al., 2009).

Family Related Risk Factors for Autism

As reported by mothers 18% of the families had Emotional problems and Schizophrenia. 16.7% reported that their families had Emotional problems, 10% of the families have Emotional and Behavioural problems, 11.7% have Schizophrenia, Moreover, 26.7% reported that their families had no problem *(see figure 1)*. Figure 2 demonstrates siblings diagnosed with autism. As reported by mothers of the children with autism 13.3% of the siblings was diagnosed with autism.

Conclusion

The purpose of the study is to be identifying the risk factors related Autism Spectrum Disorder. The risk factors included are medical, developmental, prenatal and family related risk factors. Most the mothers (83.1 %) reported that they first identified the problem in their children between age range 1-5 years but 16.4% reported that they first identified the problem in their children between the age 6-10 years because lack of awareness and acceptance (Zuckerman et al., 2014). 90% of the children actual diagnosis was autism and only 4 cases having comorbidity. Medical risk factors included that 38.3 % of the mothers reported that their children were suffering from jaundice, influenza, lack of oxygen (at the time of birth), pneumonia and high fever whereas only 1.7 % reported that their children were not suffering from any of illness. 36.7 % of the mother reported that their children had been hospitalized. Most of the mothers (55%) reported that their children taking both allopathic and homeopathic medicines. 91.7 % reported that their children were taking to spiritual Healer. Findings also suggest that most of the parents taking their children

to spiritual Healer (Ravindran & Myers, 2012). Keeping in view literature preview present the medical risk factors for Autism Spectrum Disorder. Developmental risk factors included that 56.7 % of the mothers reported that their children were delayed in following activities (Crawl, sit, stand, speech, walk, feed self and dress self). Most of the mothers (63.3 %) reported that their children were not toilet trained. Previous literature supports the findings that children autism was not toilet trained (Dalrymple & Ruble, 1992). 75 % of the mothers reported that their children had sleep difficulties. Findings also suggest that children with autism had sleep difficulties (Rossignol & Frye, 2001; Cortesi et al., 2010; Melke et al., 2008; Feng et al., 2012). Keeping in view literature preview present the developmental risk factors for Autism Spectrum Disorder. Prenatal risk factors included that 91.7 % of the mothers reported that they experienced kind of stress during pregnancy. Findings also suggest that mothers experienced any kind of stress during pregnancy may be associated with risk factors for Autism Spectrum Disorder (Ward, 1990; Beversdorf et al., 2005; Kinney et al., 2008; Limperopoulos et al., 2007). As reported by mothers 85 % of the mothers and fathers are cousin to each other. Precious literature also supports the findings that cousin marriage can be cause of Autism Spectrum Disorder (Morrow, 2008; Hamamy, 2012). 46.7 % of the mothers reported that they had fever during pregnancy. Findings also suggest that fever during pregnancy may be associated with risk factors for Autism Spectrum Disorder (Zerbo et al., 2012). 73.3 % reported that they took no vaccinations during pregnancy it may be associated with risk factors for Autism Spectrum Disorder. Vaccination during pregnancy reduced the risk factors for ASD (Krause, Gershwin, & Shoenfeld 2002). Most of the mothers (86.7 %) reported that they are suffering from viral illness (cold, influenza, measles, mumps, rubella and seizures) during pregnancy. Prenatal viral infection has been reported to be associated with Autism (Anderson et al., 2007; Patterson 2009; Miller et al., 2005; Pardo et al., 2005; Meyer et al., 2007; Blattner, 1974; Arndt et al., 2005). Most of the mothers (86.7 %) reported that they had diabetes during pregnancy. It may be associated with risk factors for Autism Spectrum Disorder. Previous researches also support the findings that diabetes during pregnancy has been associated with autism (Gardener et al., 2009; Krakowiak et al., 2012). As reported by mothers 93.3 % had high blood pressure during pregnancy. Previous researches support the findings that mother hypertension has been associated with autism (Krakowiak et al., 2012). 71.7 % of the mothers reported that they were not taking prenatal vitamins during pregnancy.

Schmidt et al., (2011) determine the association between autism and maternal vitamin Results indicated that maternal vitamin consumption before and during pregnancy may reduce the risk of having offspring with autism. Most of the mothers (78.3%) reported that they had exposure to pesticides during pregnancy. It may be risk factors for autism. According to McCanlies et al., (2012) Autism is associated with Parental Occupational Exposure. Keeping in view literature opening present the prenatal risk factors for Autism Spectrum Disorder. Family related risk factors include that 26.7 % of the mothers reported that their families had no problems. But 18 % reported that their families had emotional problems and Schizophrenia (Ionita et al., 2014). Keeping in view literature preview present the family related risk factors for Autism Spectrum Disorder.

Limitations and Suggestions

1. Present study includes only mothers of children with autism of Islamabad and Rawalpindi through purposive sampling.
2. The sample size was comparatively small and is made for only twin cities. So, the generalizability of the result is limited. To enhance the generalization of study should include the mothers of children with Autism of other hospitals and cities as well. Further researches should target larger sample.
3. The tactful attitude is connected to the stigma of psychological illness. So, lack of awareness and acceptance lead to late interventions. There is need to develop awareness program regarding this issue.
4. Participants reported that checklist were lengthy. Therefore, some short form of checklist, self-report inventories, should be made to study the construct in less time. So, time limitation problem will also reduce.
5. For the purpose of acquiring more information and to increase awareness regarding this problem more researches be encouraged and conducted in this field.

Implications of the Study

Important implications of the study are.

1. The study can be helpful to inform people about reason behind cause of autism.
2. This study will be beneficial in designing and intervention to reduce autism in children.
3. This result provides the guidelines for the further researcher.

4. . This research will help to create awareness among people that there are certain medical, developmental, prenatal and family related risk factors that cause Autism Spectrum Disorder. By avoiding few environmental hazards, we can prevent Autism Spectrum Disorder.

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APPENDICES

Appendix A

Inform Consent

I, Shabana Hussain, MSc research student at National Institute of Psychology, Quaid-i-Azam University Islamabad. I am conducting a research as per degree requirement. The purpose of this research is to study Risk Factors for Autism Spectrum Disorder.

In this regard, your valuable cooperation is required so, I would request you to participate in it. You are provided with some statements and your opinion is desired.

Your participation and support will be highly appreciated. I assure you that information provided by you will be kept confidential and will only be used for research purpose. You have full right to quit at any stage. If you want to get information about the result, then you can email on Shabanahussain004@gmail.com.

Participation in this research is completely based on your willingness to participate.

If you agree to participate then please sign below.

Thank you!

_____

(signature)

Shabana Hussain (shabanahussain004@gmail.com)

National Institute of Psychology (NIP)

Quaid-i-Azam University,

Islamabad.

Appendix B

Questions from Literature Review

1. Child sex.
2. Socioeconomic status.
3. Race Ethnicity.
4. Maternal education.
5. Maternal age at time of birth (over 35, under 17).
6. Father age at time of birth.
7. Father education.
8. Extreme length of gestational age.
9. Maternal place of birth at the time of child birth.
10. Birth weight.
11. Maternal place of birth.
12. Maternal smoking 3 month before or during pregnancy.
13. Influenza (commonly known as "the flu", is an infectious disease caused by an **influenza** virus) during pregnancy.
14. Anti- fever (substance that reduce fever) medication taken during pregnancy.
15. Delivery payer (Government programmed or private insurance).
16. Maternal parent with diabetes.
17. High blood pressure before pregnancy.
18. Diabetes Pregnancy.
19. Pesticides exposure during pregnancy.
20. Maternal residence at the time of delivery (residence to freeways and major roadways during pregnancy and near the time of delivery, as a surrogate for air pollution exposure).
21. Viral infections during pregnancy.
22. Medications during pregnancy.
23. Complications during pregnancy.
24. Month and season of conception.
25. Maternal pre and postnatal stress.
26. Work place exposures to some chemical.
27. Alcohol taking during pregnancy.
28. Maternal metabolic conditions during pregnancy.

29. Took anti diabetic medication.
30. Was the pregnancy planned.
31. What was the family situation during pregnancy?
32. What was the mother condition during pregnancy?
33. Maternal vitamin intake before and during pregnancy.
34. Exposure to maternal infection.
35. Use of an iron-specific vitamin.
36. Lack of oxygen at birth.
37. Labor and delivery problem (normal delivery, labor more than 24 hours).
38. Condition at birth (jaundice, infection, trouble sleeping).
39. Maternal residence at the time of delivery (residence to freeways and major roadways during pregnancy and near the time of delivery, as a surrogate for air pollution exposure).
40. Unhappy emotional state.
41. Cousin marriage.
42. Having sibling with ASD.
43. Heritability.
44. Family history of difficulties.
45. Genetic (identical twins).

Through interview from experts some questions were excluded and some questions were added for development of checklist

Appendix C

General Information about child

1. Child's age:	
2. Child's Gender:	
3. Racial ethnicity:	
4. Mother's Age (at time of child's birth):	
5. Mother's Occupation:	
6. Father's Age (at time of child's birth):	
7. Father's Occupation:	
8. Child's age:	
9. Socioeconomic status:	☐ Lower ☐ Middle ☐ Upper
10. Sibling(s):	
11. Twins (if):	

12. When was the problem first noticed?

_____

13. What is the Childs Diagnosis? _____

Medical History

1. Did your child suffer from any of the following illness and conditions?

☐ Allergies
☐ Asthma
☐ Jaundice
☐ High Fever
☐ Lack of oxygen (at the time of birth)
Other (s)_____

☐ Mumps
☐ Pneumonia
☐ Seizures
☐ Influenza (flu)
☐ None of these

2. How much did the baby weigh at birth?

☐ Pounds (lb)
☐ Ounces (oz)

3. List any major accidents or hospitalizations:

4. Is the child taking any medications? If yes, please identify:

5. Have there been any negative reactions to medications? If yes, identify:

Developmental History

1. Provide the approximate age at which the child began to do the following activities:

☐	Crawl	☐	Walk
☐	Sit	☐	Feed self
☐	Stand	☐	Dress Self

2. Is your child toilet trained? ☐ Yes ☐ No
3. If yes how old was your child when he/she was toilet trained? _____
4. Does your child have any sleeping difficulties? ☐ Yes ☐ No

Family related information

1. Family history of difficulties (check all that apply):

☐	Mental illness	☐	Emotional Problems
☐	Drug Abuse	☐	Behavioural Problems
☐	Learning Disability	☐	Retardation
☐	Seizures/Epilepsy/Neurological Problems	☐	None of these

Other(s): _____

2. Is there any other sibling diagnosed with Autism Spectrum Disorder? ☐ Yes ☐ No

Mother related information

1. Was the pregnancy planned? ☐ Yes ☐ No
2. Did the mother experience any kind of stress during pregnancy period? ☐ Yes ☐ No
3. Are both mother and father cousins to each other (Cousin Marriage)? ☐ Yes ☐ No
4. Month and season of conception of the baby: _____
5. What was the mother's condition during pregnancy?

☐ fever
☐ Under 17 during pregnancy
☐ Used Drugs
☐ Drank Alcohol
☐ over 35 during pregnancy
☐ smoked
☐ Diabetes
☐ None of these

Other (s)_____

6. List any medications (if) taken during pregnancy

_____

7. Experienced any Labor or delivery problems?

☐ Labor less than 2 hours
☐ Caesarian section
☐ labor more than 24 hours

Other(s)_____

8. Maternal metabolic condition during pregnancy: _____
9. Maternal residence at the time of delivery: _____
10. Who was the payer for delivery charges?
    ☐ Government programmed
    ☐ Private insurance
    ☐ Parents themselves
11. Did the birth mother have any vaccinations during the pregnancy? If yes, what type?

18. Preterm labor requiring treatment such as bed rest or medication
- ☐ Yes
- ☐ No
- ☐ Don't know

19. Hypertension (High blood pressure)
- ☐ Yes
- ☐ No
- ☐ Don't know

20. If YES Was this treated with medication?
- ☐ Yes
- ☐ No
- ☐ Don't know

21. Other major illness or injury _____

22. In this pregnancy did the birth mother take prenatal vitamins?
- ☐ Yes
- ☐ No
- ☐ Don't know

23. If YES (in case of taking prenatal vitamins) Did the birth mother take them continuously throughout the pregnancy?
- ☐ Yes
- ☐ No
- ☐ Don't know

24. In what trimester did the birth mother take prenatal vitamins?
- ☐ 1st trimester
- ☐ 2nd trimester
- ☐ 3rd trimester

25. In this pregnancy did the birth mother take any other nutritional supplements?
- ☐ Yes
- ☐ No
- ☐ Don't know

26. If Yes, What type of nutritional supplements? Please list:

_____

27. Pesticides exposure during pregnancy?
- ☐ Yes
- ☐ No
- ☐ Don't know