Developmental Delays among Infants and Young Children in Addis Ababa: Screening, Risk Factors and Intervention

(Doctoral Dissertation)

Addis Ababa University

College of Education and Behavioral Studies

School of Psychology

By: Moges Ayele

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Abstract

Several studies emphasized the importance of developmental and readiness testing as that would enable early identification of those who need support or further assessment. Besides, researches showed that children who were at risk or who experienced delayed development when passed through early intervention they manifested positive gains in development. In this connection, this study was conducted with three objectives in mind. The first one was screening for developmental delays among infants and young children of Addis Ababa; the second one was identifying risk factors associated with global developmental delay; and the third objective was conducting intervention with some developmentally delayed infants and children. To achieve these objectives descriptive survey and quasi-experimental designs were implemented. A sample of 1,062 infants and young children were randomly selected from Bole, Addis Ketema and Kolfe sub-cities. Infants and young children's development was assessed by using Ages and Stages Questionnaire – Amharic version. Besides, the characteristics of home environment, maternal and child conditions were gathered with the questionnaire set for this purpose. Following screening for developmental delays, three months intervention was carried out in two randomly selected sites. A total of 29 participants were involved in the treatment group and 19 participants did take part in comparison group. Data on children's developmental status were collected before and after intervention. The data collected were analyzed through logistic regression analysis, MANOVA, t-test, frequencies and percentages. The results of the investigation revealed that 28.13% of infants and young children involved in this research revealed global developmental delay and more delayed development was observed in fine motor domain as 30.53% of children showed delayed development in this domain. From the risk factors evaluated in this research maternal age, low birth weight, physical punishment, unavailability of playing materials, exposure to illness and family size were found to be significantly associated with global developmental delay. However, when predictor variables entered the statistical model the proportion of variance explained by the variables examined was very small in most cases and the largest one was 19.9% which was the explained variance on communication scores for infants of 18 months age interval. The results of the intervention study showed that infants and young children in comparison group performed better than those in the treatment group. Based on the findings obtained some recommendations are made.

Chapter One

Introduction

1.1 Background of the Study

Since long ago professionals concerned with child development and welfare such as psychologists and pediatricians were interested in testing and screening infants and children to determine how they are progressing through the developmental course. In this regard, the influential figure whose work gained wider recognition was Alfred Binet who developed an intelligence test that allowed practitioners to identify children who could not benefit from regular educational programs and who demanded additional support. In addition to Binet, Gesell (Dalton, 2005) has developed a scale that enabled pediatricians and adoption agencies to differentiate potentially normal infants from those who were at risk for abnormal development. Similarly, Bayley (2006) developed Bayley Scale which was used by pediatricians to assess developmental delays and plan for intervention strategies.

Even in recent years several writers stressed the importance of developmental and readiness testing as that would enable early identification of those who need support or further assessment (Drummond, 2004; Branson, Vigil & Bingham, et al., 2008; Rydz et al., 2006). Some of these writers particularly pointed that screening should be conducted as early as possible as the early years are crucial for optimal brain development. Others showed their concern over having accurate and efficient developmental screening tests that are vital for early identification of developmental problems (Heo, Squires, & Yoyanoff, 2008; Nsamenang, 2009).

In countries where adequate studies were conducted, it was observed that a significant number of children had problems related to development, emotion or learning. For example, in the USA it was observed that one in five children had a developmental, learning or emotional problem (Drummond, 2004). Rydz and colleagues (2006) reported this figure to be between 12% and 16%. In another related study, it was shown that 14% of all Netherlands children manifested developmental difficulty of some kind (Scholte, Van Berckelaer-Onnes, Van der Ploeg, & Van den Bergh, 2008). Furthermore, a study conducted in Taiwan revealed a slight increase (by 7.7%) in a number of children with developmental delays from year 2003 to 2007(Lin, Yen, Wu, & Kang, 2009). Similarly, Hannus, Kauppila, and Launonen (2009) documented an increase (from 0.04% to 0.69%) in the prevalence of delayed language development in Finland.

As far as the state of developmental disabilities and delays in Africa is concerned, though data are lacking for the continent in general, the existing data for some countries depict that a considerable number of children is affected by various forms of developmental disabilities. For instance, Mung'ala-Odera and colleagues (2006) reported the prevalence rate of 9.3% of neurological disability among children of Kenya. These disabilities involve epilepsy, cognition, hearing, and motor and vision impairments. Saloojee, Phohole, Saloojee, and Ijsselmuiden (2006) on their research showed that about 1 million disabled children live in the Republic of South Africa. In the Republic of South Africa, the prevalence of developmental disability among children was estimated to be between 5.2% to 6.4%. One research assessed the developmental status of Rwandan children on various developmental domains such as gross and fine motor development, acquiring language and social skills. Children involved were those infected by HIV and the uninfected ones. From the infected group 12.5%, 16%, 20%, and 9% showed delayed

development at 6, 12, 18 and 24 months respectively (Msellati et al., 1993). These prevalence rates are even lower when compared to what was shown in the Republic of South Africa where 72% and 52% of HIV infected children showed motor delay and cognitive delay respectively (Potterton et al., 2009). In the Republic of South Africa an investigation conducted in one school involving 174 children revealed that 42% of the participated children tested positive for one or more developmental disability which was higher than the official figure reported by school head (Giarelli, Clarke, Catching, & Ratcliffe, 2009). However, information on developmental disabilities is rare not only in Africa but also in the whole developing world. In this regard Durkin (2002) pointed that though large numbers of children who live in the developing countries are exposed to various forms of disability not much is known about the prevalence and causes of developmental disabilities in these countries of the world. Durkin thought that some kinds of developmental disabilities seem to be more prevalent in these countries such as severe mental retardation.

One may question the link between disability and developmental delay. As it is depicted in some detail in another section below, some authors understand developmental delay as it is categorized under neurodevelopmental disability. Given this notion, in Ethiopia, though the data were not specifically on developmental delay, it was reported that people living with some form of disability in the country range from 1.9% to 2.95% of the total population from which about 15.9% goes to children and adolescents below age 14 (Tirussew, Savolaninen, Agedew, & Daniel, 1995; Tirussew, 2005). However, these figures and other figures reported by the Central Statistical Authority based on population and housing census carried out in 1984 and 1994 were seriously questioned by a recent work of Seleshi (2010). In his work addressing disability and

development, Seleshi argued that a proportion of people living with disability could be 10%, which is in agreement with what WHO indicated in its document that in any country the proportion of people living with disability is 10%. In substantiating his ideas, Seleshi presented prolonged war, drought and famine that Ethiopians endured would make the prevalence of people with disability higher than what was indicated by the official documents that make the proportion less than 4% to the maximum.

While addressing developmental delay, researchers attempted to investigate why developmental delay occurs in infants and children. In other words researchers tried to come up with risk factors that contribute to developmental delays. Some writers showed that infants born with low birth weight are at the greatest risk for developmental delay (Delgado, Vagi, & Scott, 2007). In the same way it was found that maltreated children are also at risk for developmental delay (Barth, et al, 2008). On the other hand, Hurlock (1997) has mentioned factors such as intellectual development below the norm as a factor for developmental delay. Poor intellectual development itself may be brought due to hereditary endowment children born with and/or the poor environmental conditions that children do encounter in their lives. This interferes with normal brain development during late prenatal and early postnatal life and could contribute to developmental delay in cognitive development. Moreover, some writers pointed that children from disadvantaged socio-economic groups are at a greater risk for developmental delays (Smith & Ashiabi, 2007). Furthermore, an investigation by Srour, Mazer, and Shevell (2006) showed different etiological contributors such as genetic factors or chromosomal abnormality, intra-partum asphyxia, cerebral dysgenesis, psychosocial deprivation and toxic exposure as causal factors for developmental delay.

Some investigations of screening for developmental delays were initiated due to parents' concern on their children's level of progress in mastering the developmental milestones. For instance a study by Eddey (1995) was initiated due to parents' concern and data confirmed parents' perception of their children's level of development. In other instances, in some developed countries there is "child-find program" in which case professionals conduct developmental surveillance and screening during well-child visits. A research on this "child-find program" revealed that the program was effective in identifying children eligible for early intervention (Shannon & Anderson, 2008).

The basic aim in conducting developmental surveillance and screening is to identify children who are at risk and who would benefit from early intervention to tackle the negative effects of developmental delay and other developmental disabilities. In some countries like India it was indicated that people's awareness about developmental delay and early intervention was low (Kaur et al., 2006). Yet it was well established through randomized and controlled investigations that children with developmental delay or who were at risk for developmental delay, and who passed through early intervention programs showed both short-term and long-term gains compared to their control counterparts in the areas of intellectual development, school or educational achievement and on economic matters or being self-supporting economically later in life (Ramey and Ramey, 1999). Some writers strongly pointed that about 200 million children worldwide fail to reach their developmental potential (in the developing world especially in South Asia and Sub Saharan Africa) because they are not in a position to get the services that enable them to overcome developmental delay and other disabilities that hinder their optimal development (Grantham-McGregor, et al. 2007).

In recent years, the government of Ethiopia gave due emphasis to promote health care services through Health Extension Program in the country by training and deploying Health Extension Workers throughout the country (Federal Ministry of Health, 2007). One area of training health extension workers received was family health which focuses mainly on mother and child health. This coupled with the other recent initiative taken by the government of Ethiopia to strengthen Early Childhood Care and Education would offer an opportunity to switch developmental screening and testing to the programs being implemented. As there is a strong association between the understanding one has about the developmental status of children and provision of appropriate care to children, linking the two will contribute a lot for the nation's development. It is noted that recently three Federal Ministries, i.e. Ministry of Education, Ministry of Health and Ministry of Women Affairs came together to launch an integrated national Early Childhood Care and Education Policy and Strategic Framework. The policy focuses on four areas including: parental education, health and early stimulation programs, pre-school community-based kindergarten, and community based non-formal school readiness programs (Ministry of Education, 2010).

What initiated the student researcher to conduct this study was lack of studies addressing the topic under investigation in the country. As to the knowledge of the student researcher, there are no studies on the areas of developmental disabilities mainly developmental delays. These sorts of studies are very essential to serve as stepping stone to conduct further investigation as to how we can intervene to help families having children with developmental disabilities. In addition to what has been mentioned, knowing the magnitude of the problem would create awareness among the public regarding the action to be taken to avert negative outcomes by intervening early with

the problem. Besides we do not have empirical data concerning the time period in which children of the country master the developmental milestones. While making an attempt to investigate developmental delays the student researcher also aims to shade some light on how the city's children progress on mastering developmental skills in five major areas including: gross and fine motor skills, communication, problem solving, social and personal skills. On top of these, as mentioned, the Ethiopian government has made very encouraging and strong move in the area of early childhood care and education (ECCE). One focus area in the ECCE policy is health and early stimulation programs. The student researcher strongly believes that before we move to implement these programs we have to know about the developmental status of our children, which can be accomplished through developmental screening and surveillance. It is generally an accepted fact that children are the future of any country and student researcher believes that due emphasis should be given to this segment of the population including those that experience disabilities of some kind.

1.2 Statement of the Problem

Researches in human development showed that human beings progress through a series of stages mastering developmental tasks and reaching developmental milestones (Berk, 2003). This is to say infants and children develop fine and gross motor skills, perceptual, cognitive, language and communicative, social and personal skills within specified age ranges. When infants and children fail to master and assume developmental milestones within specified range of time (allowing for normal variation) or when they lag behind their peer groups, they are said to have developmental delays. Individuals may have developmental delay in one or more of the domains shown above. It was to identify these delays and related difficulties that researchers (as shown

above) were screening and testing infants and children's level of mastery of developmental tasks and skills that they are expected to attain at specified age range.

Even though an attempt has been made elsewhere to present how developmental delay is conceptualized, some authors showed that it is not easy to clearly put the concept of developmental delay in a way that is acceptable to all members of the scientific community. The problem is that development is individualized in its very nature, i.e. individual children master developmental milestones at varying age ranges that are considered to be normal ranges and there is no clear cut boundary where that age range turns out to be abnormal or delayed (Shevell, 2010; Bernheimer, Keogh & Coots, 1993). Similarly, Frankenburg (1994, 2002) pointed out that there is no one definition of developmental delay that is acceptable by all. According to him developmental delay can be seen based on several factors such as the rate of previous development in a child, degree of delay and what parents or others expect of a child. A kind of developmental delay that was treated in this research is given the name global developmental delay which is operationally defined by the American Academy of Neurology as significant delay in two or more areas of functioning as determined by standardized and norm referenced measures of development, where 'significant' means scoring 1.5 to 2 SD points below the mean (Shevell, 2010). Also, delays in specific developmental domains were given some attention too.

As mentioned in different sections of this research, several factors predispose children to experience developmental delays. For instance, Sameroff, Seifer, Barocas, Zax and Greenspan (1987) indicated that developmental gains of children are affected by a number of factors working together and not by a single risk factor, which involve social and environmental factors. In this line these authors showed that children who were exposed to several multiple risk factors

more likely showed developmental lag in cognitive functioning compared to children who were exposed to lesser risk factors. Similarly, King, Logsdon and Schroeder (1992) showed that predicting developmental delays would be best achieved when we consider both biological and environmental risk factors and the power of prediction would become less when we only consider either biological or environmental risk factors.

Also, it was indicated in various sections of this study that when children at risk for developmental delays or who encountered developmental delays exposed to early interventions they performed better on developmental tasks. For example, in one study authors provided home based parent training for teenage black mothers who gave birth to preterm infants. After the intervention program these preterm children showed optimal growth and achieved higher scores on development screening test. Even after some months later these children scored superior results in another development screening test (Field, Widmayer, Stringer, & Ignatoff, 1980).

In Ethiopia there is no such practice as screening for developmental delays and developmental disabilities. But a research conducted abroad on adoptees taken from Ethiopia showed that Ethiopian adoptees have uncertain ages, exhibit few behavioral problems at arrival and have better growth and may have less severe developmental delays (Miller et al., 2007). Also one study conducted on HIV-1 positive hospitalized Ethiopian children revealed that some of the patients manifested developmental delay to some extent (Beyne and Moss, 1991). Even if no screening was made country wide, one would assume that a significant number of infants and preschoolers of Ethiopia have developmental delays to a certain degree. This research is therefore an attempt to conduct developmental screening in Addis Ababa and to conduct intervention with some developmentally delayed children and to determine the effectiveness of

the intervention in bringing change on the developmental outcomes of the children who would pass through the intervention program.

1.3 Conceptual Framework

Shevell (2010) in his article "Present Conceptualization of Early Childhood Neurodevelopmental Disabilities" put developmental delay among the neurodevelopmental disabilities. He asserted that neurodevelopmental disabilities are common problems that lead care givers to look for assessment and intervention. According to him neurodevelopmental disabilities hamper acquiring of the fundamental developmental skills in age appropriate manner. This is to say those children with neurodevelopmental disabilities fail to master basic developmental skills at a culturally expected age. As such those children with global developmental delay fail to progress at the same rate as their non-delayed counterparts in various domains of development. As showed above several factors are implicated in leading to developmental delays such as low birth weight, maltreatment, genetic factors, impoverished environment or growing in a disadvantaged socio-economic environment where children lack nurturing opportunities to grow and develop in optimally healthy manner. Even though these factors are mentioned by some authors as risk factors contributing for developmental delays some writers pointed that the exact source of neurodevelopmental disabilities is not known (Shonkoff & Marshall, 2000).

Stepping on what has been shown, the student researcher came up with the conceptual framework presented in figure 1. As shown in the figure, child development is conceived as situated between the two interrelated forces and factors that have great influence on the ways caregivers provide care and support to their children. These factors are home related factors and maternal, birth and child related factors.

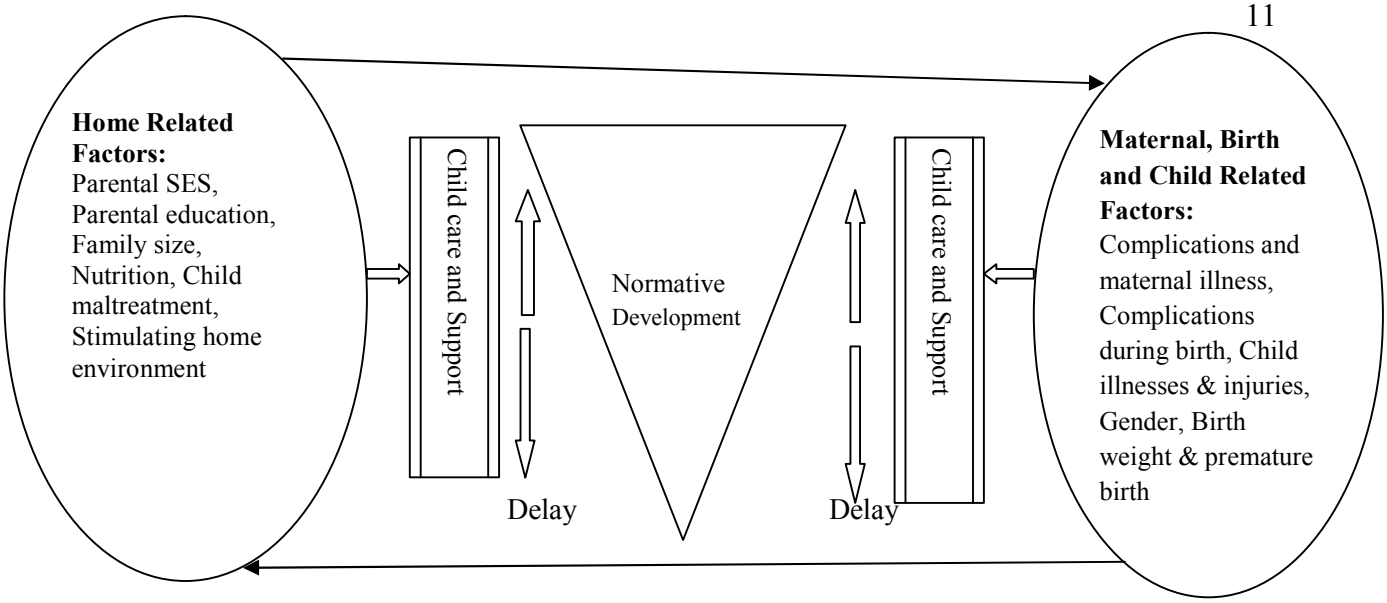

Fig 1. The Conceptual Framework for Child Development and Risk Factors for Developmental Delays

Home related factors involve factors such as parental socio-economic status, family size, and child maltreatment. Family SES got close attention by researchers who study about child development given the fact that it creates disparity among households in creating home environments that promote child wellbeing and development or not. This means families in the upper SES can provide for their children stimulating home environment as well as other provisions that are needed for the children's wellbeing and development whereas those in the lower strata could not afford that as needed and it may tax their children's development (Brooks-Gunn & Duncan, 1997). Writers debated on what SES represents; whether it stands for economic position or social status. These days, among psychologists SES is better understood as comprising financial capital, human capital and social capital (Entwistle & Astone, 1994; Guo & Harris, 2000). To measure SES writers propose using indices such as house hold income, occupational status and access to social connections. However, the general agreement among

scholars is using combination of indices rather than using one index alone. In this line the indices used to approximate SES are household income, educational status and occupational status (White, 1982). Parental education as one component in SES has a moderating effect on children's various developmental outcomes such as intellectual gains (Rowe, Jacobson, & Van den Oord, 1999). The other component of SES household income investigated and reflected in poverty and growing in impoverished homes. In this connection a research has revealed that poverty enduring for long period of time had more severe effect on children's cognitive and socio-emotional development and school achievement than temporary poverty. The mechanisms of how poverty affects child development were that it reduces the resources which may enable to tackle the detrimental effects of perinatal complications; it limits access of having cognitively stimulating home environment; it may contribute to harsh and inconsistent parenting; and it may bring high level of intense and prolonged stressors in the home environment (McLoyd, 1998).

Family size as another home related factor would influence child development through determining the degree of parental involvement with their children (Elder & Bowerman, 1963). As family size influences parental involvement with their children and other conditions of home environment is related to diverse developmental outcomes of children such as intellectual development. In relation to this an investigation revealed that children from large family size with congested environment showed low development in their intellectual ability (Dandes & Dow, 1969).

In the conceptual framework another home related factor showed is child maltreatment. Child maltreatment is conceptualized as a social problem of abusive treatment of children by care

givers involving physical abuse, sexual abuse, emotional abuse and neglect. When children are treated in this way it is seen to affect children's emotional development (Maughan & Cicchetti, 2002). Besides, maltreated children were seen to show delayed development in auditory comprehension of spoken language and on their verbal expressive ability. In other words child maltreatment contributes for delayed language development (Allen & Oliver, 1982).

The second component in the framework represents maternal and child related factors. Researches documented these factors' influence on children's development. In this regard it was reported that minor anomalies during pregnancy contributed to disruption in neurological development. The other observation made was that birth and neonatal optimality were correlated with developmental outcomes but inconsistent results were obtained (Largo, et al. 1989). In another research physical statuses of children at birth were found to be correlated slightly with later intellectual and language outcomes. In this research it was also observed that mother-child interaction early in life was strongly correlated with children's intellectual and language outcomes (Bee, et al. 1982). In another similar research it was documented that encountering severe illness during perinatal period contributes significantly to low cognitive and language development in preterm infants (Siegel, 1982). Similarly, a research by Rizzo et al. (1995) revealed that perinatal complications and morbidities contribute to poor psychomotor development in children. Moreover, a research by Goldstein, Caputo, and Taub (1976) revealed that perinatal factors such as delivery complications contributed to poor development of children at their one year of age. In the same way an investigation carried out from four weeks of pregnancy to 2 years of postnatal life examined prenatal and perinatal factors on children's physical, intellectual and social development. In this research it was reported that 14% children

were below average in their physical development, 16% were below average in their intellectual development and 12% in their social development (Werner, Simonian, Bierman, & French, 1967). Besides complications in delivery and pregnancy, exposure to toxic substances like lead during prenatal life was found to be associated with poor cognitive development. A research by Belinger, Leviton, Waternaux, Needleman, and Rabinowitz (1987) assessed varying levels of exposure to lead during pregnancy and the result revealed that there was 4.8 points difference in cognitive measure between children who were exposed to high and low level of lead during their prenatal life. There is evidence also to low language development in children whose mothers smoke during pregnancy (Tomblin, Smith, & Zhang, 1997).

In addition to maternal and child related factors described above other factors such as gender, birth weight, premature birth, childhood illness and injuries represent the other constellation of factors affecting child care and support and also influence child well being and development. In an investigation that assessed profile of referrals for early childhood developmental delays to ambulatory sub-specialty clinics it was shown that from the two genders boys outnumbered girls especially in cognitive and language delay. To show the figures, the proportion of males was 74% while the remaining portion was for females (Shevell, Majnemer, Rosenbaum, & Abrahamowicz, 2001). Concerning birth weight most studies documented that low birth weight is a risk factor for developmental delays. For example, a research that assessed the developmental and functional outcomes of very low birth weight infants showed that 37% of the infants had delayed mental development and 29% of them had delayed psychomotor development (Vohr et al., 2000). In a similar research, Anderson and Doyle (2003) compared extremely low birth weight children with normal birth weight children on neuro-behavioral

outcomes. The results revealed that low birth weight children exhibited low performance on all the outcome measures. One could see that there is a close link between low birth weight and premature birth. As such children born prematurely are at risk of being of low birth weight. Also premature birth has its own contribution for having poor developmental outcomes. For instance, a research by Macey, Harmon, and Easterbrooks (1987) showed that prematurely born infants exhibited low exploratory play and their birth brought initially negative effect in the family. Similarly, Bhutta, Cleves, Casey, Cradock, and Anand (2002) reviewed several researches carried out on preterm and full term children. The participants were 1556 preterm and 1720 full term children. After carrying meta analysis in studies the writers concluded that preterm children are at risk of performing less in cognitive tasks and they are also at risk of developing behavioral problems. Basically, it is imperative to realize that the risk factors shown in the framework are closely related to one another. For instance, it is firmly established by studies that poverty hampers children's development and one way through which poverty affects child development by exposing children to greater risk of injuries coming from accidents and/or physical abuse. Children who sustained these challenges were seen scoring less on development assessment measures at various age levels (Aber, Benett, Conley, & Li, 1997).

In the foregoing discussion, several factors influencing child care and support were indicated as they are depicted in the conceptual framework. Obviously, these factors influence caring for children and supporting their growth and development. This issue is well investigated by Belsky (1984) who observed that parenting is affected by three sets of factors such as parental psychological resources, children's characteristics and contextual factors. For instance, child conditions such as delayed development put a strong pressure on psychological resources of

parents. Concerning this issue a research by Cameron and Dobson (1991) showed that specific child characteristics such as adaptability, demandingness and distractibility appear increasing maternal stress level. In the same manner a study by Moran, Pederson, Pettit and Krupka (1992) revealed that caring for developmentally delayed children presented a greater difficulty and challenge to the caregivers which actually induce stress on parents though the stress level was not as such different from the normative stress level. Though it is agreed that child characteristics and functioning are linked to parental stress, an investigation by Smith, Oliver, and Innocenti (2001) revealed that factors such as income, time availability and social support were found to be better predictors of parenting stress than child functioning. At any rate it is possible to accept the findings of most studies that showed that child functioning and characteristics are related to parental stress. The other question one could ask in this connection is the direction of influence. Concerning this the study by Baker et al. (2003) showed that the direction of influence was bidirectional. This is to say heightened parental stress contributed more to children's developmental difficulties and high level of children's difficult behaviors seen worsening parenting stress.

The other set of factors implicated in parenting behavior is contextual factors that may involve passing through and enduring economic hardships. In this regard it is observed that economic hardships reduce the ability of parents to carryout supportive, involved and consistent parenting that actually hampers children's wellbeing and development. It is argued that economic challenges work through increasing psychological distress in parents as parents are exposed to multitudes of negative life events including absence and disruption of bond between couples (McLoyd, 1990). In another related research Lugo-Gil and Tamis-LeMonda (2008)

investigated the relationship among family resources, parenting quality and children's cognitive development. The findings revealed that there was reciprocal relationship among the variables entered in the model such as family resources, parenting quality and cognitive development of children. In another related research parenting quality was seen to be affected by parental ego-resiliency, parental education, support from spouse and infants' emotional functioning. In turn parenting quality was associated with children's attachment security and cognitive development (Van Bakel & Riksen-Walraven, 2002).

As parenting and caring are influenced by sets of factors shown above, focused intervention was shown to bring substantial change in parenting behavior that brought adequate gain in children's developmental outcomes. In an experimental study Moxley-Haegert and Serbin (1983) employed developmental education that focused on five skill building tasks such as tearing or folding papers to teach fine motor skills for parents of developmentally delayed children and no such education was provided for parents in control group. After the experiment children in experimental group showed gains in mastering diverse skills and the parents in experimental group showed high motivation in participation of home treatment programs than those in control group. Similarly, Moran and Whiteman (1985) employed the procedure of play oriented training for parents of children with developmental delay where parents were trained how to use cues and rewards in teaching their children how to play with the toys and after the training the researchers observed that mothers used the training to teach their children target skills and their children displayed an increase in the rate of appropriate play. In another investigation Koegel, Bimbela and Schreibman (1996) examined the effectiveness of teaching of individual target behaviors and teaching of pivotal responses to mothers who had children with developmental problems. The

result revealed that parent training that made use of teaching pivotal responses was found to be effective in promoting interaction between parents and children. More comprehensively, randomized and controlled investigations such as the Milwaukee Project, Perry Preschool Project, Abecedarian Project, Project CARE and Infant Health and Development Programs that involved children at risk for developmental delay showed positive gains in children who passed through intervention programs (Ramey & Ramey, 1999).

1.4 Objectives

The general objective of this study is to find out the overall prevalence of developmental delays among infants and young children in the city of Addis Ababa and to conduct intervention with some developmentally delayed children. The specific objectives of the research are:

- To identify the prevalence of developmental delays involving physical development (specifically gross and fine motor skills); communication skills; problem solving skills; and social and personal skills;
- To determine the prevalence rate of global developmental delay, i.e. delayed development in two or more areas of development;
- To assess risk factors associated with global developmental delay in infants and young children of Addis Ababa; and
- To conduct intervention with some developmentally delayed children.

1.5 Operational Definitions

Developmental Delay: delay in specific or global functioning of infants and young children involving domains such as physical, communication, problem solving and personal and social

areas where infants and young children significantly lag (where a child's performance on developmental tasks lie 2 standard deviation points below the mean of her/his age group).

Delay in Physical Development: delay in fine and gross motor skills of infants and young children in which case infants and children are lagging behind compared to their age mates at the level shown in the above definition

Delay in Communication: delay in language skill of infants and young children in both receptive and expressive aspects that is when their score is at or below 2 standard deviation points from the mean

Delay in Problem Solving: delay in problem solving skills manifested in how children play with different objects and playing materials in their surrounding

Delay in Personal Social Skills: delay in carrying out self-help skills and in their interaction with other people in their environment

Chapter Two:

Literature Review

2.1 Child Development Studies

Literature on children was scanty before 1700 Europe and children's situation was not very well known during the period (Siegel and White, 1982). Complementing this point it was indicated that two centuries ago children's variation in their ability and growth was not clearly recognized; how they learn and what underlies effective and ineffective adjustment was not well understood. It was stated that even it was not easy to measure the height and the weight of school children, as parents did not consent, as the parents perceived it as invasion of the rights of children. In those days, only limited individuals kept records of their own children, who were scientists and that resulted in the creation of a baby biography (Anderson, 1956).

As recorded works were limited about children's life in the medieval period Europe what we now know about the life of children of the period was speculative. Influential book with the title *Centuries of Childhood* was written in this way based on inferences from paintings of the medieval period Europe particularly from those representing families and children. In this book attempt was made to show how parents dealt with their children and kinds of games that were played by children (Siegel and White, 1982). Siegel and White contrast this work with contemporary works where writers can use multitudes of written records of children from various sources such as birth certificates, medical records, school records, institutional records and the like.

On his part Anderson has described about a book on child development that was written in 1888 as the book did not give any account on individual differences or differences in growth;

limited coverage was made on learning and memory and much of the book was devoted to sensation, perception and reasoning. During this period (late 19th century) studies focused on testing reaction time, color discrimination and memory in children yet the investigations did not show any link to school activity (Anderson, 1956). However, later experiments on learning made it clear that improvements in learning can be measured and demonstrated; with this researchers witnessed that ways of improving learning can be acquired through experimentation. Initially, this experiment was conducted on adults but later it was extended to children. To illustrate the ways of improving learning Anderson mentioned the works of William James, Thorndike and Woodworth.

The work that revolutionized and gained great attention came in the turn of the 20th century through what Alfred Binet did. Binet was dissatisfied with what has been the common practice of his time, putting children into institutions intuitively without objectively measuring the children's level of aptitude. In his relentless effort to develop objective measure of children's aptitude Binet has tried a number of tools even phrenology and palmistry (Binet, Simon, Jenkins, & Paterson, 1961). Later on he developed the method of age scaling. Binet showed that children's acquisition of learning tasks increases rapidly with age. In his work Binet noticed that difference in mental level produced difference in children's school performance. Prior to Binet these differences were attributed to working habits, moral inclination and generally willingness of a child over which children had volitional control (Anderson, 1956). It was heart-breaking incidence to see that children were severely punished for what we now know that their failure to meet the expectations of the parents or that of the school was due to their inadequate ability (Anderson, 1956). Binet's work did away with this blame that injudiciously put over children. In

the subsequent years all types of children were measured using the tool Binet had invented. Binet's work created awareness among psychologists in the relationship of chronological age and mental processes and his techniques spread rapidly throughout the world (Anderson, 1956). The major concern of Binet was not only to invent objective measure of children's aptitude but also after knowing their aptitude to gear ones teaching to the ability level of children. The variation in ability level according to Binet was highly related to the social class of children. He believed that there was a strong link between "psychological poverty and physiological deficiencies" (Binet, & Heisler, 1975).

Other developments were witnessed in the years of 1920s that were highly focused on physical and mental development of children. During this period there came into existence well baby clinics, preventive pediatrics, school health programs, child guidance clinics, mental hygiene clinics and above all child development movement was initiated (Anderson, 1956). Of course, child development movement came into existence a little earlier. Educators, physicians and other social scientists gained understanding and knowledge about children in informal way and accidentally. This trend changed starting from 1890s with dedication and effort of G. Stanley Hall who led the movement (Siegel & White, 1982). With the leadership of Hall scientific studies on children were conducted in organized and systematic way, resources were allocated and journals were published. Due to this contribution Hall is regarded as the father of developmental psychology.

In line with what has been shown, Anderson (1956) reported that well organized research in the area of child development was begun in the early twenties. Some of the published works in this period include physical growth of children, mental growth curves of normal and superior

children, studies on gifted children, the behavioral development of infants and young children, Harvard Growth Study and Chicago Growth Study. The prominent figures that led these initiatives were Baldwin, Terman, Gesell, Dearborn and Freeman. The works of Thorndike and his followers in the area of aptitude and achievement tests for children had a tremendous importance as well.

When we shift our focus to Africa some notable studies were conducted on African children in the later part of the twentieth century. For instance an investigation conducted on infants of Uganda by Mary Ainsworth revealed that Ugandan infants develop strong intimate attachment to their mothers early compared to the infants of America as it is manifested by occurrence of separation anxiety early in the life of Ugandan children than American children (Ainsworth, 1967). In the same country Warren and Parkin (1974) carried out a comparative study between Ugandan and European infants to search for evidence to prove or disprove a conclusion reached by Geber and Dean (1957). Conclusion reached by the latter authors was that African infants show very early psychomotor maturity for their age. In what they had presented Geber and Dean (1957) made it clear that African infants showed very early maturity in motor development accompanied by early development in language, adaptive and personal-social behaviors. This precocity as the authors maintained diminishes and disappears by the age of 3 years. Werner (1972) reported similar finding after analyzing 50 cross cultural studies that were carried out in five continents where the precocity of African infants was determined while Latinos and Asians take the middle position and Caucasians were in the bottom. Hennessy, Dixon and Simon (1984) also reported slight precocity in motor development of African young children. However, the findings by Warren and Parkin did not allow them to conclusively accept or reject the conclusion

of Geber and Dean. They observed differences between African and European infants but the differences were small to support the claim of early neurological and behavioral maturity of the groups compared. Similarly, Keefer, Tronick, Dixon and Brazelton (1982) observed that Gusii children of Kenya showed superior muscle tone and muscle control compared to American children but they did not differ significantly in other motor activities such as pull to sit, in defensive reactions and general activity level. These authors said that Geber's and Dean's work did not clearly specify how African children differ from Caucasians. Brueton, Palit and Prosser (1973) reported similar finding by saying that Nigerian infants did not show precocity. Paine and Pasquali (1983) reported similar results after investigating infants elsewhere. However, a study by Ashton (1973) extended the conclusion of Geber and Dean even to older children based on their observation of Yoruba children of Nigeria. Another research by Aina and Morakinyo (2005) in the same country revealed the same result in which Nigerian infants of 8, 16 and 32 weeks showed higher performance in motor skills compared to western children. Of course the issue of precocity is not limited to African children. But researchers claimed that precocity is evident in traditional communities of the world. After reviewing these studies Super (1991) said that these researches showed young children of traditional communities show precocity of two or more weeks compared to children of industrialized nations. In a recent research, Kelly, Sacker, Schoon, and Nazroo (2006) investigated the question of precocity from a different angle. They took a sample of 15, 994 infants from different ethnic groups living in the United Kingdom. The ethnic groups they studied were Black Africans, Black Caribbean children, Indians, Pakistanis, Bangladeshis, and White children. In their study they observed that the likelihood of Black African, Black Caribbean, and Indian children to show motor delay was very less compared to

other ethnic groups involved in the investigation. In other words these groups of children are ahead of other groups in motor development. From the ethnic groups Pakistani and Bangladeshi infants showed greater likelihood of exhibiting fine motor delay and communicative gesture.

As far as studies on Ethiopian children are concerned, not much is known about children and childhood in Ethiopia. However, limited investigations were carried out on children of the country. For example a research by Abbink (1996) on Surma children revealed that both sexes do similar activities until they reach the age of 8 years. Once they reach this age, children assume different gender roles. As this author reported Surma parents do not use physical punishment, rather they reprimand and instruct their children and in this community children are encouraged to be verbally proficient and are expected to anticipate the intentions and actions of other people. The research by Abraham (1996) on Silite children showed that child parent interaction in this community is restrictive, which does not encourage autonomy and initiative in children. In this community children are not encouraged to ask, express their own ideas or converse with adults. However, providing opportunity to communicate and other early stimulations were seen crucial in facilitating language learning, development of cognitive abilities and for stable personality development (Habtamu, 1996).

Awan (2007) on his part investigated how adults and children perceive child growth in two districts of Addis Ababa. His work extended to analyze how Christians and Muslims view normal and deviant growth and he found no differences in the views of these two groups. In his work Awan found that gender and age are the two major factors that determine how children should be treated and what the society expects from them. A research by Ayele (2007), on the

other hand, compared rural and urban children in Amhara region. From what he has observed Ayele concluded that life is more difficult for rural children than for urban children and even in countryside life is more difficult for girls than for boys. These difficulties make children's participation in schooling and other aspects of life more difficult or impossible as confirmed by Berre's (2004) research. Similar research by Binyam (2007) in South Ethiopia indicated that rural children seem to be more physically punished compared to urban children and rural children appear to rarely question customs and norms. Another researcher Nardos (2007) also reported similar findings saying rural children have more household chores compared to urban children and they are restrained and shy compared to urban children.

Moreover, based on her extensive observation for about 30 years Poluha (2004) depicted Ethiopian society as hierarchical, authoritarian and resistant to change. She continued to comment that Ethiopian adults expect obedience and respect from their children and to teach these values to their young adults use various forms of rewards and punishments. Tirussew et al (1996) reported the same finding where parents and caregivers participated in the study wanted to see desirable characteristics in children such as obedience, respect, and politeness. To develop these traits in children study participants used various disciplining strategies mainly advice and punishment.

Finally a study conducted in one of the zones of Amhara region to assess the participants perception about childhood showed that both parents and children perceive childhood in the same way. For instance the years between 0-5 depicted by participants as the stage of "Aemro Yal lew" which shows children of this age do not know about themselves and demand careful

attention of parents or care givers. Children between the ages 5-7 years regarded as “Nefis Yaweke” meaning they know about themselves and can serve parents in some way. Married girls between the ages 8-12 are regarded “no more children” and they are grouped under adults. Boys of the same age, however, are not categorized as adults lest they are married which often observed when boys reach their twenties (Save the Children, Denmark, 2002). In line to this, Tirussew et al (1996) investigated how study participants conceptualized child development. To come up with the conceptualization the researchers raised several questions such as when children differentiate their parents from others, when children recognize speech, when they recognize stories and at what age children begin to think. The study participants showed approximate ages when children begin to do the skills shown. For instance according to study participants children begin to differentiate their parents from others at about four to six months of age, children develop thinking at about age of one to three years, children start recognizing speech between the age of one to two years and it is good to talk to babies starting from the age of three months.

2.2 Developmental Screening of Children

Developmental screening of the population of young children was introduced since 1960s mainly in Europe and the United States. The initiative was taken by World Health Organization that formed a working group that worked on the conceptualization of screening, which was understood as the use of some procedures by health personnel that would show them whether some kind of disability is evident or not evident in children. After screening if children are suspected of having a disability then those children will be referred to specialists for further

evaluation and possible intervention (Drillien and Drummond, 1983). During those years emphasis was placed on looking at whether children master developmental milestones in the areas of sitting and walking unsupported at expected age and using sentences in age appropriate manner; while the use of single words was not found to be as such important in predicting later success of children in their life (Neligen & Prudham, 1969). The other area of development that health professionals were interested in was physical growth involving height, weight and head circumference. Regarding this issue de Onis (1996) reviewed early works by Meredith, which was based on data from children of Iowa in the US, and later works such as Harvard growth curves and the Tanner growth curves were used as frames of references. Especially the revised version of Harvard growth curve was disseminated by WHO as a frame of growth reference to be used by health professionals of several countries.

All encompassing developmental screening is carried out in the Scandinavian countries mainly in Sweden and Finland. For instance in Finland screening is carried out monthly during the first year and in the subsequent years until school entry, every child is expected to be tested at least once every year. In Israel (where we have comprehensive nationwide developmental screening too) developmental testing is conducted three or four times during the first year of children's life, two times during the second year of life and once a year from three to five years. Child screening and examination is compulsory in France and parents are required to take their child for screening in the eighth day after birth, in nine months and two years. In the United States developmental screening sprung up in the early years of 1960s and well-organized documents guiding developmental screening were produced during 1970s (Drillien & Drummond, 1983).

2.3 Conceptualization of Neurodevelopmental Disabilities

Shevell (2010) indicated that neurodevelopmental disabilities during early years of children's life when encountered often trigger demand on the part of parents or caretakers for seeking assessment and intervention. However, parents concern often may not be about global development but mostly about children's emotion or behavior and about their children's language or speech (Glascoe, 1994). Assessing young children's developmental problems basically require having a picture of what particular capabilities children show at different period of development. For instance during the very early years the focus of assessment on infants' abilities involve abilities such as motor capabilities, sensory reactions, cries, and other kinds of body movements. When children's age increases the focus of assessment still not ignoring gross and fine motor capabilities involve other areas such as cognitive abilities and language development. In preschool years it is possible to assess quite diverse abilities such as higher mental processes including abstraction, language processing, attention control, and social competences (Allen, 2005; Peterson, Kube & Palmer, 2006; Kelle, 2010). Neurodevelopmental disabilities thus are childhood developmental problems that are closely linked to the inability of mastery of these different capabilities. According to Shevell (2010) neurodevelopmental disabilities are developmental disabilities that involve a group of disabilities that have a common feature of not acquiring developmental milestones in age appropriate way. These developmental functions often categorized into different domains, include such as fine and gross motor skills, language and speech, cognitive capabilities, personal-social skills and adaptive skills that are

necessary for daily living. In reality these clusters are closely related to one another, gain or failure to master in one domain affecting gain or failure of mastery in another domain.

Neurodevelopmental disabilities, as put by Shevell (2010) involve disabilities such as cerebral palsy, intellectual disability, developmental language impairment, pervasive developmental disorders including autism and global developmental delay. Cerebral palsy is a disorder that basically impairs movement with an early onset due to lesion in the brain with enduring and unyielding impairment in the lives of affected children. Intellectual disability, which was often termed as mental retardation involves difficulty with intellectual or cognitive functioning, coupled with limitations in adaptive personal social skills that are needed for proper functioning in ones daily life. Developmental language impairment on its part is conceptualized as identifiable impairment often in both expressive and receptive language capabilities as detected by standardized measures of language performance. The other category mentioned by Shevell under neurodevelopmental disabilities was pervasive developmental disorder also termed as autism spectrum disorders. Autism spectrum disorders fundamentally involve disorders such as autism, Rett syndrome, Asperger's syndrome, childhood disintegrative disorder and pervasive developmental disorder not otherwise specified. Features such as impaired communication, language and social interaction, and problems with behavioral flexibility and imagination essentially characterize these disorders. In his previous work Shevell (2009) showed neurodevelopmental disabilities are said to consist other disorders such as learning disability, attention deficit hyperactivity disorder and developmental co-ordination disorder. Learning disability that is evident during school years is conceptualized as the mismatch between ones aptitude and achievement. In other words when children achieve significantly below their

intellectual ability, then we say these children experience learning disability. Attention deficit hyperactivity disorder is understood as a disorder that involves inability to control one's impulse, attention and movement. Developmental co-ordination disorder is reserved for children who are clumsy.

2.4 Global Developmental Delay as a Neurodevelopmental Disability

As presented by Shevell (2010) conceptualization of developmental delay particularly global developmental delay as a distinct category is a recent development reflecting our emerging interest in a broad array of early childhood skills and abilities. In addition to this, professionals are asked to provide information to families who want to know about their children's functioning vis-à-vis their chronological age. Shevell described that recognizing global developmental delay presumes an understanding that developmental routes children follow is invariably individualized, with wide range of variations considered as "normal" without pure demarcation line separating "normal" from "abnormal". Similarly the document of National Research Council, Institute of Medicine (2002) well articulated that due to a wide array of individual differences that we observe among young children most of the time it is not easy to make distinction of normal variations and maturational lags from temporary disorders and permanent disabilities. Besides, one has to be aware of the fact that development is not smooth; there are times when children rapidly acquire a given skill, practice it for some time, get used to it and then move forward. Also Garrett, Ferron, Ng'Andu, Bryant, and Harbin (1994) indicated that typical development moves on sequentially. That is to say acquisition of more complex skill is dependent on the mastery of relatively simpler skills. With this understanding global developmental delay is conceptualized as a condition that represents a delay in skill mastery in

two or more areas of development. In other words global developmental delay is a significant delay in two or more areas of development where significant mean scores below two or more standard deviation points are situated on norm referenced age appropriate evaluation measures.

In the same way Peterson, Kube, and Palmer (2006) coined the term developmental delay to denote the situation in which children lag in mastering developmental milestones in one or more areas of development. The authors pointed that it is more of a complaint than a diagnosis. However, Shevell (2010) understands it as a diagnostic category. Aly, Taj and Ibrahim (2010) conceptualized developmental delay in the same way as the others shown. For Aly et al. developmental delay is inability to master age proper functioning in one or more areas of development. From this one would see that assessing developmental delay demands gathering information in functioning in multiple developmental domains (Garrett et al, 1994).

By looking into the phrase developmental delay one may think that children with delayed development may catch up with their peers although lately. But writers who have done considerable study on this area pointed that they may grow to be intellectually disabled or may develop learning disability when they grow up into school age years and beyond (Shevell, 2010). The evidence for this claim came from what Shevell, Majnemer, Platt, Webster, and Birnbaum (2005) obtained in their investigation of developmental and functional outcomes of school age children who were developmentally delayed in preschool years. This study made it clear that 75 to 100% of children who were with global developmental delay performed below 1.5 standard deviation points on a developmental test during school years. Similarly from developmentally delayed children about 61 to 76% performed below more than 1.5 standard deviation points on functional measures during the school age years. In other related research Shevell, Majnemer,

Webster, Platt, and Birnbaum (2005) showed that children who were found to be with developmental language impairment during their preschool years continued to exhibit developmental and functional impairment during school entry and even the impairment was not limited to the domain of language. Based on these observations Shevell (2009) presented that global developmental delay may be a precursor to intellectual disability. This author also pointed that these two conditions (intellectual disability and global developmental delay) share some common characteristics. Hence one may see these two as complementary even though not as one and the same. At their core both of them are said to possess a problem in learning.

2.5 Screening for Developmental Delays

Since long ago professionals concerned with child development and welfare such as psychologists and pediatricians were interested in testing and screening infants and children to determine how well they are progressing through the developmental course. In this regard, the pioneer was Alfred Binet who developed an intelligence test that allowed practitioners to identify children who could not adequately learn in regular educational programs and who demanded additional support. In addition to Binet, Gesell (1934; cited in Santrock, 2007) has developed a scale that enabled pediatricians and adoption agencies to differentiate potentially 'normal' infants from those that were at risk for abnormal development. Similarly, Bayley (1969; cited in Santrock, 2007) developed Bayley Scale, which was used by pediatricians to assess developmental delays and plan for intervention strategies.

Even in recent years several writers stressed the importance of developmental and readiness testing as that would enable early identification of those who need support or further assessment

(Drummond, 2004; Branson, Vigil & Bingham, 2008; Rydz, et al 2006). Some of these writers particularly pointed that screening should be conducted as early as possible as the early years are crucial for optimal brain development. Others showed their concern over having accurate and efficient developmental screening tests that are vital for early identification of developmental problems (Heo, Squires, and Yoyanoff, 2008). Though developmental screening tests are used widely in US and other countries of the world, Meisels (1989) raised his concern on the validity and reliability of most of these tests. For instance in his study Meisels showed that Denver Developmental Screening Test which was widely used among professionals though it has excellent specificity it has very poor sensitivity, i.e. it fails to identify large number of children with developmental problems. He suggested then that when developmental surveillance and screening are conducted to identify children with developmental problems practitioners should be cautious about the procedures and tools that they use to attain their goals. On its part the American Academy of Pediatrics (AAP) recommends developmental surveillance to be part of every child visit programs and any concern if raised during surveillance should be immediately addressed with developmental screening tests. Besides, it is recommended that developmental screening tests ought to be administered on regular basis during 9^{th}, 18^{th} and 30^{th} month visits (Council on Children with Disabilities, 2006). However, in one of the states of the US (North Carolina) developmental screening was required to be conducted at 6, 12, 18, 24 months 3, 4, and 5 years of children's life (Earls & Hay, 2006). Regular screening also showed to enhance surveillance by increasing the likelihood of early identification of children with developmental delay for early intervention (Marks, Glascoe, & Macias, 2011).

Hamilton (2006) pointed that children experiencing developmental problems may go undetected if primary physicians simply depend on their clinical observation and judgment and if they only use informal milestone reviews. This would happen in spite of the fact that children may obtain programmed visits from health professionals. Obvious neurodevelopmental disabilities such as cerebral palsy and severe mental retardation can be easily identified by parents, care givers or professionals. But subtle neurodevelopmental disabilities may not be easily identified. Palfrey, Singer, Walker, and Butler (1987) also commented that the nature of the developmental problem children experiencing for instance its severity and complexity would allow physicians to easily and early identify the problem. At any rate some children with developmental disabilities are left undetected. However, using developmental screening tests allow health professionals to effectively and efficiently identify infants and young children with developmental delays. For instance Blumkin and Szilagyi (2010) indicated that using developmental screening test doubled the detection of developmentally delayed children. In this study initially physicians were made to use medical chart review to identify children with developmental delay. Later on they were made to use the developmental screening test. During the initial period they identified 29% of the children as developmentally delayed. But after introducing the developmental screening test they were able to detect that 58% of the participating children who were developmentally delayed. More specifically by using medical chart review physicians identified 14% of infants as delayed which was increased to 37% when developmental screening test was used. For toddlers it was increased from 42% to 89% and for preschoolers it was from 44% to 82%. One research by Hamilton (2006) showed that only 15 to 20% of physicians used standardized developmental screening tool to screen more than 10% of

children seeking their service. In addition to using standardized developmental screening tools on regularly programmed bases, some writers suggested the importance of listening to parental concerns. For instance Glascoe (2003) indicated the importance of considering parental concerns regarding children's behavior and social skills as predictive of children's developmental problems. The presence of either of these concerns increases the likelihood of the occurrence of actual problem in children's life. This author Glascoe (1999) indicated that attending to parental concerns is as equally important and accurate as to using screening tests for identification of children with developmental disabilities. He showed that in spite of differences in educational and parenting experiences parents can raise invaluable concerns that can be used by health care professionals. Besides, Glascoe and Dworkin (1995) emphasized the role of taking into account parental appraisals and descriptions in detecting children with developmental problems. Especially the authors recommended the use of parental concerns and parent completed high quality measures in the screening of infants and young children with developmental disabilities. Moreover, Diamond (1993) put that considering parental concerns regarding children's various skills such as language and speech, intellectual ability and parents rating on a temperament measure accounted for 27% of the variation in the probability of screening failure or referral. One early research also showed that when parents were concerned about their children's mastery of skills such as language, articulation, fine motor skills and overall development, 80% of these children failed in developmental screening measures (Glascoe, Altemeier, & MacLean, 1989). Chung et al. (2011) made the same observation in which they have studied the association among parental concerns and children's outcomes such as functional impairment and final diagnosis and indicated that parental worries regarding language and motor abilities are good predictors for

detection of children with these developmental delays. Tervo (2005) made more or less similar observation. Furthermore, Tervo and Asis (2009) reported high likelihood of detecting children with developmental problems when parents showed their worries on their children's ability of language comprehension and social skills. However, Hart, Bax and Jenkins (1978) warned health care professionals should be cautious not simply to use parental reports of their children's mastery of developmental milestones. Research by these authors showed that parents did not accurately account the acquisition of their children's developmental skills. As they have observed parents' ability to remember their children's mastery of developmental skills was seen to decrease with increase in time from the developmental incidence. The parents' recall was better for gross motor skills such as walking and their recall was worse for other skills such as smiling. Besides the authors noticed considerable inconsistencies during their follow up study where parents recalled as smiling occurring later than previously indicated and all other skills as occurring earlier than indicated on the first study.

The value of using well-standardized developmental screening tests is frequently mentioned above for identification of children with delayed development. Most researches showed that using high quality developmental screening tests allow health care professionals to identify children with developmental delay more accurately and efficiently. These tests can be of two general types. One group of tests requires direct performance of skills by children being tested coupled with report from parents on some items. The second group of tests involve items exclusively responded by parents about their children's developmental status and mastery of various skills (Hamilton, 2006). Even though some people questioned the effectiveness of parent

completed developmental screening tools a research by Rydz et al (2006) compared two parent completed tests (Child Development Inventory and Ages and Stages Questionnaire) with a developmental screening test that demands direct elicitation of developmental skills from children (Battelle Developmental Inventory). They also investigated whether clinical judgment has incremental value in identifying children with developmental delays. The general conclusion these researchers reached was that parent completed developmental screening tools can be used effectively for identification of children with developmental delays and clinical judgment of physicians did not contribute significantly in increasing the likelihood of identification of children with developmental delays. In other similar research Guiberson, Rodriguez and Dale (2011) studied the accuracy of three parent completed measures of language development and their findings revealed that parent completed measures were found to be accurate and well correlated with a criterion measure.

2.6 Prevalence of Developmental Delays

Worldwide a significant number of children experience problems related to development, emotion or learning. For example in the US it was observed that one in five children had a developmental, learning or emotional problem (Drummond, 2004). Rydz, et al. (2006) reported this figure to be between 12 and 16%. In another related study it was shown that 14% of all Netherlands children manifested developmental difficulty of some kind (Scholte, Van Berckelaer-Onnes, Van der Ploeg, & Van den Bergh, 2008). Furthermore, a study conducted in Taiwan revealed a slight increase (by 7.7%) in a number of children with developmental delays from year 2003 to 2007(Lin, Yen, Wu, & Kang, 2009). In the same country where the

government requires reporting of identified cases, an investigation was carried out to determine the rate of incidence as well as prevalence from 2003 to 2008. Within these years 73, 084 new cases were seen among young children between ages 0 to 5 years having developmental delays. The incidence rate was 5.7 to 11.1 per 1000 person-year for those children below age three and 7.9 to 11.4 per 1000 person-year for those between age three and five (Lai, Tseng, & Guo, 2011). In a recent research that covered twelve years period in the US from year 1997 to 2008 the prevalence of developmental disability including developmental delay increased from 12.84% to 15.04% (Boyle et al. 2011). Similarly a research by Hannus, Kauppila, and Launonen (2009) documented an increase (from 0.04% to 0.69%) in the prevalence of delayed language development in Finland from 1989 to 1999.

Eapen et al. (2006) conducted an investigation in UAE and came up with the prevalence rate of 8.4% of global developmental delay among research participants. Petersen, Kube, Whitaker, Graff, and Palmer (2009) reported more or less similar prevalence rate of 8.6% of developmental delay in the southern United States. It seems that these figures by Eapen et al. and Petersen et al. were a bit higher when compared to the figure reported by Shevell et al. (2003), which was about 3%. Simpson, Colpe and Greenspan, (2003) reported similar figure to that of Shevell and associates after questioning parents on their children's mastery of age related tasks and after posing questions related to developmental delay. These authors came up with the prevalence of 3.3 to 3.4% of delay through their investigation of 15, 291 children. However, one research revealed the prevalence rate of developmental delay to be 10% (Drillien, Pickering, & Drummond, 1988) that was somehow higher to what were seen in the reports of Eapern et al. and Petersen et al. Although a research carried out in Bogota, Colombia which involved 2,043

preschool children revealed that 10.8% of the participant children had global developmental delay that was more or less similar to the finding of Drillien et al. (1988). This Colombian study showed that 9.3% of the children had delay in gross motor skill, 10.3% had delay in fine motor skills, 18.6% had language delay and 9.8% had deficit in personal-social skills (van Meerbeke, Talero-Gutierrez, & Gonzalez-Reyes, 2007). Bang (2008) has showed the prevalence of 11. 1% of developmental delay among Korean children that was slightly greater than what was shown by Drillien et al. (1988) and van Meerbeke et al. (2007). Rosenberg, Zhang and Robinson (2008) reported even a higher prevalence rate of 13% of developmental delay among children born in 2001 in the US. These differences in prevalence rates are most likely the result of differences in conceptualization of developmental delay(some writers assign developmental delay to more areas of development such as hearing, vision, neurological functioning whereas others understand it as inability to attain developmental milestones in age appropriate way). In connection to this a research on US children 0 to 17 years of age that assessed for developmental problems such as hearing, vision, epilepsy, speech problems, cerebral palsy, delay in development, learning, emotional and behavioral problems comprised 17% of the study participants (Boyle, Decoufle, & Yeargin-Alisopp, 1994). Even in some special population the prevalence rate was estimated to be a bit higher. For instance in children of foster care homes the prevalence rate is estimated to be between 13-62% (Lesile, Gordon, Ganger, & Gist, 2002). With this estimate Lesile et al. (2002) collected data on 798 children living in foster care homes using Bayley Scales of Infant Development II and 34% of these children found to be developmentally delayed. Similarly, a research conducted in a pediatric hospital in US also resulted in similar prevalence rate of 33.5% for developmental and behavioral disorders (Petersen, et al. 2009).

As far as the state of developmental delays and disabilities in Africa is concerned, most of the studies on developmental assessment of children are not as such accessible since they are confined in academic corners as presented by well known African researcher on developmental science (Nsamenang, 2009). This implies that data are lacking for the continent as a whole on this matter, yet the existing data for some countries depict that considerable number of children is affected by various forms of developmental disabilities and developmental delays. For instance, Mung'ala-Odera et al. (2006) reported the prevalence rate of 9.3% of neurological disability among children of Kenya. These disabilities involve disabilities such as epilepsy, cognition, hearing, and motor and vision impairments. Saloojee, Phohole, Saloojee, and Ijsselmuiden (2006) on their research showed that about 1 million disabled children live in the Republic of South Africa. In the Republic of South Africa the prevalence of developmental disability among children was estimated to be in between 5.2% to 6.4%. One research assessed the developmental status of Rwandan children on various developmental domains such as gross and fine motor development, acquiring language and social skills. Children involved were those infected by HIV and the uninfected ones. From the infected group 12.5%, 16%, 20%, and 9% showed delayed development at 6, 12, 18 and 24 months respectively (Msellati et al., 1993). These prevalence rates are even lower when compared to what was shown in the Republic of South Africa where 72% and 52% of HIV infected children showed motor delay and cognitive delay respectively (Potterton et al. 2009). In the Republic of South Africa, an investigation conducted in one school involving 174 children revealed that 42% of the participated children tested positive for one or more developmental disability which was higher than the official figure reported by school head (Giarelli, Clarke, Catching, & Ratcliffe, 2009). In another research by

Giese and Dawes (1999) substantial number of institutionalized children in the Republic South Africa showed significant delayed development in five dimensions of development. However, information on developmental delays and disabilities is rare not only in Africa but also in the whole developing world. In this regard Durkin (2002) pointed that though large numbers of children who live in the developing countries are exposed to various forms of disability not much is known about the prevalence and causes of developmental disabilities in these countries of the world. Durkin thought that some kinds of developmental disabilities seem to be more prevalent in these countries such as severe mental retardation. Though the data are rare in the low and middle income countries an investigation conducted in Cambodia disclosed that from children who were screened for developmental delays in 2007 and 2008 25% and 31.5% respectively exhibited delayed development in one or more areas of development (Scherzer, 2009).

Ethiopia, as one of the developing countries in the sub-Saharan Africa, information on developmental delay of children is scanty and not as such available. Considering global developmental delay as a constituent of neurodevelopmental disability and having the data on disability may give some idea about developmental delay some years back it was reported that people living with different forms of disability in the country range from 1.9% to 2.95% of the total population from which about 15.9% goes to children and adolescents below age 14 (Tirussew, Savolaninen, Agedew, & Daniel, 1995; Tirussew, 2005). On the other hand, Central Statistical Authority based on population and housing census carried out in 1984 and 1994 estimated respectively 3.6% and 1.8% of the total population had disability of some kind. The 2007 census data depicted that the proportion of disabled people in the country was approximately 1.1%. However, in his recent work addressing disability and development, Seleshi

estimated a proportion of people living with disability in Ethiopia could be 10%, which is in agreement with what WHO indicated in its document that in any country the proportion of people living with disability is 10%. In substantiating his ideas Seleshi presented prolonged war, drought and famine that Ethiopians endured would make the prevalence of people with disability higher than what was indicated by the official documents that make the proportion less than 4% to the maximum. All what has been shown here is about the proportion of people living with some form of disability. This information was used because there was no study in the country indicting the proportion of children who are developmentally delayed. However, a study by Meeus, Peeters, Ramet, Van Gompel and Wojciechowski (2010) that was conducted on 99 children with their age ranging from 3 months to 8 years, who were taken to Belgium from Ethiopia through adoption, showed that 12% of the children had developmental delay.

2.7 Risk Factors of Developmental Delays

Taylor, Davidson, Howie, Davidson, and Drillion (1985) compared children with neurodevelopmental disabilities and those who were normal. In this study the researchers were observed that low socioeconomic status was associated with intellectual disability, global delay, speech delay and behavioral disorder. However, it was not related to cerebral palsy and motor delay. Siegel et al (1982) made similar observation. Najman, Bor, Morrison, Andersen and Williams (1992) after carrying out investigation in Australia found similar results showing that children from lower socioeconomic class exhibited developmental delays. In the same way a research by Najman et al (2004) revealed that parental level of income related to children's level of cognitive functioning and health and the researchers showed that children from the disadvantaged homes performed less in developmental outcome measures. Besides, a research

by Williams and Williams (1985) that aimed at establishing risk factors for abnormal or questionable performance on developmental screening test showed socio-economic status as one cluster that was associated with performance on the developmental screening measure. Moreover, Miller (1998) compared preschool aged children from poor home environment and from non- poor home environment. Children from poor home environment scored less on developmental screening measures. Sonnander and Claesson (1999) also observed a moderate but significant association between socioeconomic status and developmental delay. Nobel, Norman and Farah (2005) on their study examined neuro-cognitive functioning of young children from low and middle socioeconomic groups. Their research revealed that children from low socioeconomic group performed less in neuro-cognitive measures. Hackman and Farah (2009) reported similar result. Farah et al (2006) made the same observation too.

Regarding how socioeconomic status related to variation in developmental outcomes Hoff (2003) hypothesized that it creates different learning experiences for children living in families with different socioeconomic status. To test this hypothesis the author compared children from high socioeconomic status and middle class children. From the findings of this study the author concluded that the high socioeconomic group children showed more physical development than children from middle socioeconomic group. On the same issue Garrett, Ferron, Ng'Andu, Bryant, and Harbin (1994) commented that the way socioeconomic status affects children's development is not unidirectional. It is complex and working at different levels. However, its influence may take either in the privilege parents create for their children by organizing stimulating learning environment or their inability to create such kind of environment due to poverty that has dire effect in children's physical and psychosocial development.

Thompson et al (2003) investigated the association of birth weight to developmental delay of children. Their study revealed that birth weight is highly correlated with developmental delay. They found that a substantial number (over 60% < 1000 g and 46% of < 1500 g) of low birth weight children exhibited developmental delay. In the same way, Agustines et al (2000) observed retrospectively low birth weight infants between 500 to 750 grams. Mild or significant delay was exhibited by 68% of these children and motor delay was manifested by 58% of the children. Similarly, Schendel et al (1997) put that children with very low birth weight were seen to be in a high risk for developmental delay. Very low birth weight children who are born prematurely are even at very greater risk of experiencing developmental delay. Smedler, Faxelius, Bremme and Lagerstrom (1992) reported the same finding where very low birth weight small for gestational age children exhibited low scores on various measures such as on measures of visuo-spatial skills, non-verbal reasoning, and gross-motor coordination. Moreover, Dewey, Crawford, Craighton, and Sauve (1999) showed that children with very low birth weight exhibited very low performance on measures assessing their developmental outcomes. These children continued to perform poorly even at school age on various psychological measures. They were seen to perform poorly on measures of language and visual-motor skills (Pietz et al, 2004). Siegel et al (1982) reported similar finding. In addition to birth weight these latter authors showed other risk factors such as parental education, maternal cigarette smoking, and number of previous pregnancies. Furthermore, Vohr et al (2000) showed a number of neurodevelopmental disabilities associated with extreme low birth weight. In their investigation twenty five percent of extremely low birth weight children revealed abnormal neuralgic examination, about 37% showed globally delayed development and about 29% exhibited delayed motor development.

Concerning what predisposes children to be of low birth weight Rodriguez-Salinas, Amador, and Medina (2008) showed that not having proper nutrition during pregnancy was associated with various poor birth outcomes such as of being under weight and small head and brain size. These authors continued to indicate that even if brain growth is mainly dictated by genetic makeup it is also determined by other factors such as availability of adequate nutrition such as protein, energy and micronutrients. They also indicated that stimulation and involving children in social activities during early years of life positively contribute to brain development. On the topic of malnutrition Drewett, Wolke, Assefa, Kaba, and Tessema (2001) indicted that malnutrition during early years did contribute to enduring malnutrition in the life of children that is detrimental for children's development.

Allen and Oliver (1982) compared four groups of children, which are the abused, the neglected, both abused and neglected and non-maltreated group. From these four groups the neglected group performed less in language performance and hence child neglect was seen to be associated with language delay. In another related investigation Pears and Fisher (2005) compared maltreated and non-maltreated children and maltreated children revealed developmental delays in different areas of development such as height, head circumference, language and general intellectual functioning. In this investigation the authors showed that child neglect was negatively correlated with measures of different developmental domains. Similarly after reviewing 92 studies Veltman and Browne (2001) reported that most of the studies they have reviewed showed clear association between developmental delay and child maltreatment. The delays were reflected in the areas of cognition, language, and other capabilities. Moreover, to delineate the influence of genetics from violent environmental influences on children's neuro-

cognitive development Koenen, Moffitt, Caspi, Taylor and Purcell (2003) studied monozygotic and dizygotic twins. This investigation revealed that children who were exposed to domestic violence scored eight points lower than unexposed counter parts. The study also showed that four percent of the variation was accounted by violence independent of genetic influences.

According to Eapen et al (2006) several factors predispose children to the risk of developmental delay. These factors include complications during pregnancy and delivery, low level of maternal education, family history of developmental disorders, and serious traumatic life events. In the same way Durkin (2002) identified several factors operating in exposing children to neurodevelopmental disabilities such as genetic problems, birth to aged mothers, under nutrition and acquiring infectious diseases. In similar way Sameroff, Seifer, Barocas, Zax and Greenspan (1987) pointed that no one factor was found to promote or retard children's developmental outcomes rather several factors work in combination to affect children's developmental gains. King, Logsdon, and Schrodeder (1992) made the same conclusion suggesting that biological and environmental risk factors operate in consorted manner and enable us to predict well the developmental outcomes of children. Moreover, an investigation in Kenya that aimed at determining indicators of risk status that can be easily used in disadvantaged settings for screening and identifying children for carrying out early intervention revealed risk factors such as little maternal schooling, poor anthropometrical status, and poor health status of children in combination were found to be strongly associated with delay in achievement of developmental milestones (Abubakar, Holding, Van de Vijver, Newton, & Van Baar, 2010). A more or less similar observation was made in Korea by Bang (2008). She observed that a number of factors predisposed children for questionable development. These factors as she put included

premature birth, low parental educational level, maternal illness and un- stimulating child rearing environment or maternal child rearing attitude. The study conducted in Ethiopia by Servili et al. (2010) also showed different factors such as low level of socio-economic status, having low weight-for-age and exposure to violence as they were associated with poor scores on motor and cognitive development.

2.8 Intervention with Developmentally Delayed Children

One may question the role of early experience and the impact of intervention in reversing lack of developmental gains later in one's life. In relation to this Ramey and Ramey (1999) mentioned the classic work by French surgeon Itard who had found a boy who was left alone in the forest and naked. Even though the boy was 11 years old through educational intervention the boy showed progress in acquiring some skills. However, the boy continued to suffer from deficits in various areas of functioning such as language, social interaction skills, emotional regulation and logical reasoning. Based on this observation made by Itard these authors commented that what children experience early in life was critical in the development of later functioning in wide areas of life. They further pointed that providing good experiences or even high quality experiences later in life would not sufficiently compensate for the developmental challenges related with early neglect and not getting social stimulation and interaction. This piece of work implies the importance of paying attention to detection of developmental lag early in life and intervening with the lag to bring better outcomes in children's life.

When children with biological or environmental risk factors for developmental delay and those who were diagnosed with developmental delay pass through early interventions, the interventions brought modest positive effect in children's development (Majnemer, 1998). It was

shown that children with very low birth weight are at risk for developmental delay. Resnick, Eyler, Nelson, Eitzman, Bucciarelli (1987) involved low birth weight infants in an intervention program known as infant development program (IDP) in which participant mothers in experimental program were given counseling and parenting education. Those mothers in control group were given traditional customary postnatal care. After the intervention both experimental and control group infants were given developmental test. The occurrence of developmental delay was lower in experimental group children compared to control group children. Similarly Brooks-Gunn, Liaw and Klebanov (1991) conducted intervention with low birth weight infants and young children up to age three in the Infant Health and Development Program. In their intervention they have used education and family support. The intervention was provided during the first three years of life. After the intervention was over the efficacy of intervention was analyzed and the results revealed that the intervention brought improvement in various developmental domains. Developmental gains are more visible in the areas of receptive language, visual-motor and spatial skills. In other similar research mothers of very low birth weight children were passed through the intervention program, Meditational Intervention for Sensitizing Caregivers (MISC) in Israel. The author carried experimental investigation with this group of children and mothers. The intervention was not intensive, i.e. visiting homes of participants once in every four or six weeks for seven months. This intervention was found to be effective in enhancing mothers' ability to focus, excite, expand, reward and regulate behaviors of their children in their interaction. Children of mothers who were involved in experimental group showed improvement in Auditory Sequential Memory and in their language ability. Before intervention the children's performance was low in these skills (Klein, 1996). MISC intervention

was also carried out in Ethiopia with socioeconomically disadvantaged mothers and it has brought dramatic changes in the ways mothers interact with their children. For instance the frequency of focus changed from 10.5 to 29.6, and the frequency of dealing with meaning changed from 5.7 to 39.7 (Tirussew et al 1996).

Complementing what has been discussed above a research in Philippines showed that pre-term children with low birth weight scored significantly below the norm established for the country on a developmental screening test. These children took part in nursing intervention program that involved both children and their mothers. The intervention was developmental stimulation and the results showed that the intervention highly improved the developmental status of the children (Williams, Williams & Dial, 1986).

Similarly, as it was indicated, living in poor households is a risk that would contribute to developmental delay. In this connection intervention was carried out in Israel using the MISC model by involving sixty-eight participants from low socioeconomic group who were randomly assigned to experimental and control conditions. Experimental group received treatment of MISC where as control group participants were taught about developmental milestones during early childhood. After the intervention experimental group mothers showed increased meditational capability as revealed by increased frequency in focusing attention intentionally, showing affection, expanding, encouraging, and regulation of children's behaviors. Children of this group showed increase in the number of items they spontaneously called, posed large number of questions, showed more delight, and expressed other positive behaviors. These children also scored high in vocabulary measures and in measures of abstract reasoning compared to children in control group (Klein and Alony, 1993).

McIntyre (2008) put that when parents of developmentally delayed children were given training for 12 weeks in handling their children the intervention was found to reduce the negative parent-child interaction and child behavior problems. This study was carried out with parents having preschool aged children with developmental delays in the United States. For experimental group of participants the researcher applied customary care and parent training program with developmental delay modifications and very good results were observed in experimental group compared to control group participants. This author, Mcintyre (2008), also conducted another similar research by using a single group research design. In this study he involved families with preschool aged children experiencing developmental delays. These parents took part in 12 weeks training (on weekly basis) on issues such as developmentally appropriate play, setting limits, reinforcing and handling difficult behaviors. The findings revealed positive outcomes both on the side of parents and children.

Often times it was said that early intervention for children with developmental challenges can bring gains in cognitive, educational and social outcomes. However, Ramey and Ramey (1998) argued that mere early intervention, which is fragmented and weak may not bring improvement in the lives of developmentally challenged children. For intervention to be effective the authors suggested that it should be intensive, of high quality and it should take into account contextual factors in the environment. Besides, it was suggested that intervention programs with developmentally delayed children should not be limited in one given environment. This is seen by a study carried out by Rickards, Walstab, Wright-Rossi, Simpson and Reddihough (2007). These writers compared children who got intervention at center and those who got additional support at home as well as intervention in the center. Those children who received extra support

at home exceeded in their performance in cognitive and behavioral tasks compared to those who received intervention at the center only. In another research, Smith, Groen and Wynn (2000) showed that conducting intensive intervention brings significant improvement in the lives of developmentally challenged children. In their research these authors randomly assigned their research participants into intensive treatment group where treatment was provided for longer hours per week and the intervention duration was also lengthened. On the other hand participants in the second group were provided intervention for lesser hours per week and the duration of the intervention was also short. After the intervention children in the intensive treatment group performed far better than those in the second group on tasks of intellectual ability, visual-spatial skills and language skills.

Chapter Three

Methods

3.1 Research Design

The research designs that were used in this study were both descriptive survey research that aimed to determine the prevalence of developmental delays among infants and young children in Addis Ababa and quasi-experimental design where by some developmentally delayed children were exposed to an intervention program. Besides, descriptive research allowed the researcher to determine the risk factors that were strongly associated with global developmental delay among infants and young children who participated in the study.

3.2 Research Site

The study was conducted in Addis Ababa. Addis Ababa was selected because it is the capital city of the country and to bring influence to other parts of the country it seems important to start from the centre. Besides, Addis Ababa is the city which is inhabited by people coming from different parts of the country. That is to say Addis Ababa may be considered as a small Ethiopia given the fact that all ethnic groups of the country can be accessed as one can find them residing in Addis Ababa.

3.3 Participants

Participants of this research were infants and young children and their parents or caregivers. In other words, those children from age of 9 months to 4 years took part in this study and parents of these children were involved in this study too. Samples were drawn from the Addis Ababa city through multi-stage sampling. From the ten sub-cities three sub-cities were selected after consulting with the city administration on socio-economic variation among the sub-cities. To this

end the student researcher has visited the Ethiopian Customs and Revenue office, which is responsible for collecting revenues from the country including Addis Ababa city administration. From the data obtained from this office the sub-cities that bring the highest amount of revenue often were found to be Bole, Kirkos and Nefas Silk Lafto; those that bring medium level income were Arada, Addis Ketema and Lideta; and the sub-cities often with low revenue were Kolfe, Yeka, Akaki and Gulele. After having these three categories, from these three groups three sub-cities were selected randomly using lottery method. From the highest revenue category Bole was selected, from the medium group Addis Ketema was selected and from the low group Kolfe was selected.

These sub-cities have different number of districts (woredas as known locally). In connection with this, Bole has 14 districts, Addis Ketema has 10 and Kolfe has 15 districts. As the number of districts vary as shown from Bole and Kolfe sub-cities three districts from each were selected randomly using lottery method and from Addis Ketema 2 districts were selected. In each district there are Ketenas that comprised 500 households and assigned to one extension health worker. In this line ten Ketenas from each of Bole and Kolfe sub-cities and six Ketenas from the districts of Addis Ketema were selected randomly.

To select samples of infants and young children from the selected Ketenas in the first place sample size was determined. To determine the sample size the following formula was used.

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

Where:

n = required sample size

t = confidence level at 95% (standard value of 1.96)

p = estimated prevalence of developmental delay in the study area

m = margin of error at 5% (standard value of 0.05)

As it was mentioned in the literature part of this study, developmental delay especially global development delay appears to be a precursor of intellectual disability. Thus initially the prevalence rate of intellectual disability was planned to be employed to determine the sample size for this research. By referring to the document by Japan International Cooperation Agency (2002; cited Wa'el International Business and Development Consultant, 2000) the prevalence of intellectual disability in Ethiopia was found to be 6.5%. However, in consultation with the reviewer of the proposal the student researcher made to reconsider this estimate to determine the sample size. As such the student researcher thoroughly went through the prevalence rate of developmental delay in different parts of the world, especially in the developing world. For instance, in Columbia the prevalence rate of delayed development was 10.8% (van Meerbeke, Talero-Gutierrez & Gonzalez-Reyes, 2007). In Kenya it is about 9% (Mung' ala-Odera, et al., 2006). The research on children adopted from Ethiopia to Belgium showed the prevalence of 12% of developmental delay (Meeus, Peeters, Ramet, Van Gompel & Wojciechowski, 2010). By taking all these into account and by taking WHO's suggestion of 10% the student researcher decided to use the prevalence estimate of 10% to determine the sample size. By using all the values shown above and the prevalence estimate of 10% it gives 138. Hence, 138 infants and young children were taken from one age category and as there are 7 age categories 966 infants and young children were taken from all seven age categories. Furthermore, by expecting 10%

non-response rate additional 96 infants and young children were added to the sample size, which adds to 1062. To proportionally allocate the number of children to be taken from the three sub-cities the student researcher considered the size of infants and young children in the three sub-cities selected. The number of children below age five was taken from the health offices of the sub-cities. In this regard in Kolfe sub-city the figure obtained was 34,243, in Bole and Addis Ketema the figures were 24,524 and 20,797 respectively. Considering
these figures the samples were taken from Kolfe, Bole and Addis Ketema sub-cities i.e., 457, 328 and 277 samples were taken respectively from the three sub-cities, which add up to 1062. These samples were assessed to see how well the infants and young children were progressing through the developmental course. Through assessing infants and young children's attainment on development screening questionnaire, infants and young children with developmental delays were identified.

For the intervention (that is, quasi-experimental research) two districts were selected randomly from the districts where developmental screening was conducted. As the intention was to make one of the districts to be intervention site and the other comparison site the districts were selected from different sub-cites. In this connection district 8 of Addis Ketema sub-city and district 11 of Kolfe sub-city were selected. The two districts are far apart from one another in their spatial location. District 11 of Kolfe sub-city was randomly assigned to be the intervention site and district 8 of Addis Ketema sub-city was served as a comparison site. Forty eight parents of infants and young children with global developmental delays from the two districts were approached by health extension workers. 29 were from Kolfe and 19 were from Addis Ketema. Their informed consent was obtained and they have participated in the study.

The intervention group was exposed to the intervention involving parental training in creating stimulating and responsive environment for children. To accomplish this Meditational Intervention for Sensitizing Caregivers (MISC) model was applied. Besides, implementing the procedures outlined in the MISC model mothers or caregivers were given training on how to promote healthy development in children. The comparison group was not exposed to the intervention that involved MISC model. Yet this second group was given training on how to promote healthy development in their children. To accomplish this they were given training on different activities and playing materials that would be used to facilitate children development at different ages as shown in the Ages and Stages manual. Of course this component was also incorporated in the training of intervention group as well. After the intervention was carried out both groups children's performance on developmental tasks were compared and the impact of the intervention was assessed.

3.4 Instruments

Among researchers there was an on-going dialogue regarding whether screening tools could be filled in by parents or whether professionals should complete the screening instruments. One research in this area revealed that parent completed questionnaires can be used in identifying children with developmental delays accurately (Rydz, 2006). However, in another study that compared the agreement between parents and teachers on childhood disability it was seen that teachers rated the children's level of functioning more severely than parents (Shin, 2008). On the related issue, an African writer emphasized that though professionals on developmental assessment do not take information from significant others such as parents and siblings this practice may lead to failure to detect a child with developmental delay as parents are the

ones who first observe and recognize whether their child is developing well or he or she is lagging behind from his or her age mates (Nsamenang, 2009). The instrument that was used in this research was the Ages and Stages Questionnaire - the third edition. It is one of the instruments that parents or guardians complete after trying the activities in the questionnaire with their child. In other words in the questionnaire there are different tasks (For example, some of the items ask: Does your child say the following three words: “mama”, “dada”, and “baba”? Does your child hold and pick up a piece of bread or biscuit with the thumb and other fingers? If you show your child, Does the child bring a doll or other toy that is a bit far using a spoon or something else? Does your child drink from a cup or a glass; puts it without spilling much? While your child is holding a chair or table with one hand, Does he pick up a doll or something from the floor and return to the position where he was standing?) that infants or children are expected to do depending on their age level and parents ask their children to perform these tasks and then respond to questions in the questionnaire. The development of this instrument started in late 1970s and 1980s in the United States of America. The authors were inspired by observing a study that involved parents to evaluate their children’s developmental status and comparing parental evaluation with professionals’ evaluation of the children’s developmental status. To the authors surprise parental evaluation was consistent with the professionals’ evaluation of children’s developmental status. Initially the name given for the instrument was Infant/Child Monitoring Questionnaires. After thorough revision and modification of the items in the questionnaire the instrument got its current name the Ages and Stages Questionnaire in its 1995 publication. Since then it was revised twice and the second edition appeared in 1999 and the current third edition appeared in 2009 (Squires, Twombly, Bricker & Potter, 2009). ASQ-3

consists of 21 separate questionnaires designed for 21 age intervals from 1 month to 66 months. From these 21 questionnaires the student researcher used 7 questionnaires. These are questionnaires for 9, 12, 18, 24, 30, 36 and 48 months age intervals. These age intervals were selected by the student researcher based on the recommendation made by American Academy of Pediatrics and other writers (Council on Children with Disabilities, 2006; Tsai, McClelland, Pratt & Squires, 2006)). According to this group 9 month is a time when an infant shows development that can be reliably detected in various developmental domains such as motor development. Besides, signals of the development of early communication skills appear during this age. In addition to what have been mentioned early markers of autism such as failure to make eye contact, not responding to name being called or pointing to objects may be seen during this period. The 12 month questionnaire was selected because according to AAP if children are not tested during 9 months of age rather than waiting for the 18th month it is recommended if they are tested during their 12 months of age. The document by AAP made it clear that during 18 months of age one would accurately determine if children have delayed development in communication and language. Moreover, delayed motor development that was not detected in previous periods can be detected during this time. The 24 month questionnaire was selected for reason similar to that of the 12 month questionnaire. Concerning the 30 months questionnaire selection AAP indicated that by this age professionals can detect delays in development in various domains such as language, cognitive and motor domains. 36 and 48 months are the times when children are in kindergartens and during these times it is appropriate to assess children's development to detect problems that may hamper their readiness for schooling. Before using the questionnaires to collect data on children's developmental status in

Addis Ababa attempt was made to adapt the questionnaires to the Ethiopian context. The first step in this regard was translating the questionnaires into Amharic with the help of a language expert. After the questionnaires were translated into Amharic another language expert made back translation of the questionnaires into English. Later on both translators and the researcher came together to see the consistency of the translations in transmitting the same message in both languages. The second step was collecting opinions and ideas from a team of experts and parents regarding items in the questionnaire. In this connection, one specialist in pediatrics, three psychologists, one special needs educator and one nurse were consulted on the appropriateness of the items to the Ethiopian context. Except minor amendments in some words of the translated version all those involved in evaluating the items shared their opinion that items are appropriate for the Ethiopian children. However, one of the psychologists actually pointed whether problem solving items measure the ability to solve problems. Besides, the pediatrician showed his concern whether parents could accurately fill in some of the items. Yet the opinion of special needs educator was that parents can actually fill in the items easily as the items are not as such complicated and do not demand complex skills from parents.

Since its advent to public domain ASQ has been used in developmental screening in several countries. It is widely used in the US. Besides, developmental monitoring programs in other countries such as China, Southeast Asia, Australia, Africa, India, Europe, and Central and South America use ASQ in their projects. May be one reason why these different regions use ASQ system is its ease of administration and the low cost it incurs for service providers. Moreover, to determine its psychometric quality the data were collected from more than 18, 000 children. Above all, it has shown very strong psychometric qualities such as high reliability and

validity. The test-retest reliability and the inter-observer reliability indices were both high and the index for both was 0.96. It has also moderate to strong internal consistency as evidenced by the Cronbach alpha ranging from 0.60 to 0.85. Evidence for validity was obtained from several sources such as comparing the mean score for children with risk and non-risk. It is generally observed that children at risk had lower mean compared to children with no risk. The other evidence for validity was obtained by comparing the scores of ASQ with other scores on standardized measures. In this regard ASQ was compared with Battelle Development Inventory (BDI). The percent of agreement between the two measures in identifying children with developmental delays ranged from 82.6% to 88. 3%. Besides, showing these qualities ASQ has shown strong sensitivity (82.5-89.2%) and specificity (77.9-92.1%) (Squires, et al. 2009).

There are research evidences that support the possibility of using the norm established elsewhere in screening developmental delays in other cultures given adequate adaptation and validation studies are made. For instance a research was carried out in Korea by involving 3220 parents of young children with age ranges from 4 months to 5 years. Researchers performed different analyses such as validity, reliability and whether items functioned differently for US and Korean population. The evidence showed high validity and reliability and the items functioned largely similarly for Korean and US population. The most important finding was that the mean scores for Korean ASQ were generally similar to the US samples. Based on their observations the authors concluded that Korean ASQ was found to be valid and reliable parent completed screening instrument that can be used for developmental screening of Korean children (Hoe, Squires, & Yovanoff, 2008). Similarly, the research by Tsai, McClelland, Pratt, and

Squires (2006) showed that ASQ used for Taiwanese children was found to be culturally appropriate to test Taiwanese children.

3.5 Procedures

As described above first of all the instrument ASQ – third edition was translated to local Ethiopian language – Amharic - by language expert and back translation was also made by another language expert. Then the items were presented to a team of experts in different fields as indicated above. Afterwards the comments of a team were considered to modify or change items to be included in the questionnaire. For that matter except minor amendments in some words used in Amharic translation there was no major change in the items of the questionnaire. To collect data the student researcher recruited nurses who were working as health extension workers in the sub-cities that were selected according to the procedures showed above. Then these assistants were given one day thorough orientation on how to administer and collect data using the questionnaire.

To conduct the intervention as mentioned above two districts from two sub-cities were selected randomly. Forty nine parents of infants and young children (children who were screened with global developmental delay in these districts) were involved in parental training as showed above. Initially informed consent was obtained from parents of these children. Those parents or care givers who showed their consent took part in intervention and comparison groups. The research assistants provided training to parents in the intervention as well as comparison groups on creating stimulating environment for their children and on being responsive to their children demands and requests. As mentioned earlier Meditational Intervention for Sensitizing Caregivers

(MISC) model was employed with intervention group but not with the comparison group. This model fundamentally based on the notion that by recognizing aspects of adult-child interaction one can make the interaction that would promote more learning experience of a child (Klein, 2001).

The intervention was provided over a three month period, two days a week and for two hours per day. Parents in the comparison group also received training by research assistants. These parents received training which was similar to what parents in intervention group received but components that were shown in the MISC model were not incorporated for parents in this comparison group. Even though the three months period appears short for conducting this kind of intervention other research works carried out in Ethiopia using the MISC model showed that promising outcomes were obtained after three months of intervention (Klein, 2001). In addition to this, recently PTA (Play Therapy Africa) in collaboration with the regional health bureau and NGOs carried out intervention with infants and young children in Southern Nations Nationalities and Peoples Region (SNNPR) and after three months of intervention achieved notable outcomes too (Conticini & Quere, 2009). After the intervention was over children from the two groups were compared on their performance on the developmental tasks where they showed delayed development.

3.6 Intervention Package

As mentioned, three months long intervention was carried out with participants in the intervention as well as comparison group. The trainings were mainly focused on teaching parents what activities and playing materials can be used to facilitate children's development in acquiring skills in fine motor and gross motor domains, problem solving as well as personal

social domains. As such the objectives of the trainings were to develop proper parenting behavior in parents to promote optimal development in infants and young children. Especially parents in the intervention group were expected to master the five dimensions of the MISC model. Hence, the intervention packages were two. These were parental child development training with MISC and without MISC component. To this end, the training materials were developed consulting several theoretical formulations on promoting development in infants and young children. One training material was about how to promote development in children incorporating activities and playing materials that parents can use to foster development in their children at different age levels. The second material was developed based on the formulations of the MISC model. The components of the MISC model were incorporated and Ethiopian examples were included to make the material clear to the nurses who carried out the intervention program. Before the nurses were embarked on the intervention program these materials were given to them and they went through adequate training for one week on the procedures and processes that were required to be implemented on due course of the investigation. In the initial visit to a household a baseline data were gathered on the components of the MISC model and on the developmental status of the children. The components of the MISC model are the frequency with which the mother/care giver intentionally try to focus the child's attention on what the care giver wants the child to experience, the frequency with which the care giver attempts to expand the child's understanding, the frequency of verbal and non-verbal appreciation and mediating meaning and excitement, the frequency of mediating the feeling of competence through reward and reinforcement, and the frequency of helping the child to tune to the situational demands and to plan before doing. To collect the data checklist was set and used after getting the consent from

the participants. In the subsequent visits the components of the MISC model were adequately taught to the participants in the intervention group. Complementing this intervention materials suggested in ASQ user's guide were incorporated to the training procedure in which parents learned how to enhance their children's acquisition of various developmental skills while the children are progressing through the development course. After the completion of the intervention post intervention assessment was conducted to ascertain how far MISC model influenced parental care giving practice and assessment was carried out to see the changes made after the intervention. Fundamentally, the children's performance on developmental tasks was assessed by re-administering the ASQ. The score that children obtained this time were compared with their initial score that the children have scored during the baseline assessment. For the participants in the comparison group one of the training materials was used which did not include that of the MISC components where as the training of parents in the intervention group involved use of both training documents mentioned above. As to the children in intervention group for children in this comparison group too ASQ was re-administered and the two scores for this group were compared as well. Furthermore, the scores on ASQ were compared for both intervention and comparison group children too.

3.7 Pilot Study

Pilot study was conducted with 69 children in age ranges that took part in the main study. In this regard infants from 9, 12, 18 and 24 months as well as young children from 30, 36 and 48 month intervals were involved in the pilot study. Health extension workers and counseling psychology graduate students participated in collecting data for the pilot study. Pilot study was conducted mainly to see the reliability of the data collection instrument shown above (ASQ –

Amharic version). Reliability of the scores obtained using ASQ was determined using Cronbach alpha. The internal consistency of the instrument was found to be 0.74, which is in the acceptable range. Besides, Pearson product moment correlation was computed to see how scores in each domain correlate with scores in other domains and with the overall score. The results are shown in the Appendix A attached at the end of this paper.

It is shown in the Appendix A that all correlation coefficients computed between each developmental domain and the overall score were found to be significant at 0.01 alpha level indicating the consistency of scores on these developmental domains and the overall score. Besides, the scores in almost all of the domains were associated significantly with one another, which show congruence of the scores in these different domains.

By taking the definition that developmental delay is said to occur when a child's score lies below 2 standard deviation points from the mean and global developmental delay involves delay in two or more of the developmental areas, from children who participated in this pilot study 17.39% exhibited global developmental delay. When we assess the occurrence of developmental delay in specific domains among 9 month old infants 10% exhibited delay in gross motor skills, 30% showed delay in fine motor skills, 20% revealed delay in problem solving skills and 20% manifested delay in personal social skills. Among 12 month old infants delayed development was manifested in 20% of children in communication and gross motor skills, in 40% of children in fine motor skills and 30% in personal social skills while in 10% of them in problem solving skills. Concerning 18 month old infants delayed development was exhibited only in one domain, i.e. in fine motor skills domain in which 40% were exhibited delayed development. Moreover, from the 24 months old group 11%, 55.6%, 11%, and 33% showed delayed development in

communication, fine motor skills, problem solving, and personal social skills respectively. In young children group among 30 month olds 10%, 20%, 30%, 20%, and 70% revealed delayed development in communication, gross motor, fine motor, problem solving, and personal social skills respectively. Furthermore, from the 36 months old children group 10% manifested delayed development in communication and gross motor development and 50% showed developmental delay in personal social skills development. Finally, among 48 months old children 20% revealed delayed development in gross motor, problem solving and personal social skills and 10% exhibited delayed development in fine motor skills (see Appendix B).

Concerning risk factors related to delayed development though information is missing for some of the cases the data obtained show that low household income level (monthly income below 1000 Birr) and shortage of playing and stimulating materials at home were related to global developmental delay. This is also true for the cases who exhibited delay in one of the developmental domains such as communication, gross and fine motor skills, problem solving and personal social skills. Besides, using physical punishment also seems to contribute to developmental delay especially in communication. To evaluate these observations multiple regression analysis was carried out by taking the overall score of developmental domains as dependent variable and risk factors such as low level of maternal education, low birth weight of children, maternal age at child birth, unavailability of playing materials and non stimulating environment, use of physical punishment and low monthly income of the households as independent variables. However, no significant association was observed between these risk factors and scores on overall scores of developmental domains except one risk factor which contributed significantly to prediction of developmental gains of children. This risk factor is

unavailability of playing materials and non-stimulating home environment which accounted for 14.5% of the variance of the developmental scores of infants and young children who took part in this pilot study. Though the contribution was not significant the six risk factors shown above entered the regression model and the variance accounted for by these predictor variables was 12.4% on the overall score of infants and young children. This may be due to the small size of infants and young children who took part in this pilot study. In the main study as the sample size was increased (showed in the subsequent chapter) some of the risk factors entered the statistical models were significantly contributing to developmental delay in various areas of development as well as in global developmental delay.

3.8 Data Analysis

Data that were collected using the ASQ Amharic version, and demographic and background characteristics questionnaire were analyzed using different statistical techniques. The prevalence of developmental delays was determined by having proportions of children who performed below 2 standard deviation points from the mean for the age group in each developmental domains assessed in the investigation. In this regard, prevalence was determined for separate developmental domains and for global functioning as well. Besides, assessing the contribution of risk factors to the global developmental delay logistic regression analysis was applied as we have categorical dependent variable with two categories. The risk variables included in the study were low income of the family, the maternal age, low maternal educational level, child abuse or maltreatment, low birth weight, child's sex, child's exposure to illness, history of parental developmental problems, family size and unavailability of playing materials. Moreover, MANOVA was carried out to determine the variance accounted for by the predictor risk

variables on the scores of developmental domains of children as it is logical to think that strong correlations may exist among the dependent variables which are developmental domains. Hence, instead of carrying separate ANOVA carrying out MANOVA is recommended in this type of situation. In some instances for curiosity sake t-test was also applied to see the mean differences. Data that were collected from the intervention research were analyzed through MANOVA as well as t-test to evaluate developmental gains of children in separate developmental domains. To do all these statistical analyses SPSS for windows version 20 was used.

Chapter Four

Results

In the methods section, detail presentation was made concerning the approaches and the procedures of the study. As it was shown in the methods section 1062 infants and young children were sampled from the three sub-cities of Addis Ababa. Mothers/care givers of these children with the help of health extension workers completed the Amharic ASQ. 47 questionnaires were not fully complete and discarded while the remaining questionnaires were complete and returned. In other words, 1015 questionnaires were complete (which makes the response rate 95.6%) and were used in data analysis.

4.1 The Prevalence of Developmental Delays in each Age Interval

Infants and young children from seven age intervals were involved in this study. Infants and young children whose scores were situated at or below 2 standard deviation points from the mean were considered as developmentally delayed and these figures are shown for the different age intervals.

4.1.1 9 months old infants

Table 1

9 Month Old Infants whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 SD points N=123	Proportion
Communication	38.55	12.29	18	14.63%
Gross motor	46.72	14.45	22	17.89%
Fine motor	52.31	10.49	33	26.83%
Problem solving	49.51	10.39	24	19.51%
Personal social	42.47	11.78	15	12.20%
Delays in two or more areas			30	24.39%

Infants in this age interval were those within the age range of 9 months and one day to 9 months and thirty days. Their development was assessed by ASQ and the findings showed that delay in fine motor skill was more prevalent in this age interval (26.83%) followed by delay in problem solving skills (19.51%) and delay in gross motor skills (17.89%). Delay in two or more areas of development often referred to as global developmental delay was observed in 30 of the infants, which gives the prevalence rate of 24.39%. Delays in communication skills and personal social skills were less prevalent in this age interval as it is presented in the above table.

4.1.2 Infants in 12 Months Interval

Table 2

Infants in 12 Months interval whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 s points N=151	Proportion
Communication	43.22	13.79	8	5.30%
Gross motor	49.92	14.22	22	14.57%
Fine motor	52.22	8.86	67	44. 37%
Problem solving	48.99	10.84	38	25.17%
Personal social	45.73	12.00	37	24.50%
Delays in two or more areas			57	37.75%

Infants in this interval were infants in the age range of eleven months and one day to twelve months and thirty days. The above table shows the developmental status of infants in this age interval. As one may see from the table, delay in fine motor skills (44. 37%) was more prevalent in this age interval too followed by delays in problem solving skills (25.17%) and personal social skills (24.50%). Delays in gross motor skills and communication were less prevalent. Global developmental delay was seen in 37.75% of the infants who were involved in this survey.

4.1.3 Infants in 18 Months Interval

Table 3

Infants in 18 Months Interval whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 s points N=154	Proportion
Communication	42.30	14.62	9	5.84%
Gross motor	55.46	9.04	23	14.94%
Fine motor	52.44	9.06	58	37.66%
Problem solving	45.99	10.13	49	31.82%
Personal social	47.90	10.35	7	4.55%
Delays in two or more areas			55	35.71%

Infants within the age interval of 17 months and one day to 18 months and thirty days were involved in this age segment. As it was the case with the other two age groups shown above, in this age segment also more delay was observed in the domain of fine motor skills (37.66%), which was followed by problem solving skills (31.82%). Delays were less prevalent in the areas of gross motor skills, communication and personal social skills. Concerning global developmental delay, the prevalence rate for this age segment was 35.71%.

4.1.4 Young children in 24 Months Interval

Table 4

Infants in 24 Months Interval whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 s points N=154	Proportion
Communication	51.23	13.03	10	6.49%
Gross motor	54.73	8.33	27	17.53%
Fine motor	51.70	8.27	60	38.96%
Problem solving	49.40	9.81	26	16.88%
Personal social	51.14	9.80	54	35.53%
Delays in two or more areas			61	39.61%

Young children within the age range of 23 months and one day to 25 months and fifteen days were involved in this age interval. The pattern for this age interval was also similar to other intervals and delay in fine motor skills was more prevalent followed by delay in personal social skills. Delay in communication skills was found to be less prevalent and this was mostly true for the other age intervals as well. 61 children exhibited delay in two or more areas that gives the prevalence rate of 39.61%.

4.1.5 Young children in 30 Months Interval

Table 5

Young children in 30 Months Interval whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 s points N=123	Proportion
Communication	53.81	10.25	11	7.19%
Gross motor	53.54	8.70	19	12.42%
Fine motor	46.78	13.76	41	26.97%
Problem solving	50.18	11.55	8	5.26%
Personal social	51.87	9.93	33	21.71%
Delays in two or more areas			28	18.30%

In this age interval we had young children in the age range of 28 months and sixteen days to 31 months and fifteen days. Consistent with other age intervals, delay in fine motor skills was more prevalent (26.97%), which was followed by delay in personal social skills (21.71%). Delay in gross motor skills comes next and it was followed by communication and problem solving skills. The prevalence rate of global developmental delay for this age segment was 18.30%.

4.1.6 Young children in 36 Months Interval

Table 6

Young children in 36 Months Interval whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 s points N=152	Proportion
Communication	51.88	10.44	11	7.24%
Gross motor	54.68	8.84	20	13.16%
Fine motor	47.07	14.50	43	28.29%
Problem solving	51.97	10.84	24	15.79%
Personal social	52.82	8.74	61	40.13%
Delays in two or more areas			44	28.95%

In this age interval that involved children between 34 months and 16 days and 38 months and 30 days, delay in personal social skills was more prevalent (40.13%) followed by delay in fine motor skills (28.29%). The prevalence rate for delays in problem solving skills, gross motor skills and communication were found to be 15.79%, 13.16% and 7.24% respectively. 44 (28.95%) children from this age interval showed delay in two or more areas of development.

4.1.7 Young children in 48 Months Interval

Table 7

Young children in 48 Months Interval whose Scores were at or below 2 Standard Deviation Points

Areas of Development	Mean Score	Standard Deviation	Children Scored at or below 2 s points N=158	Proportion
Communication	52.92	11.10	5	3.16%
Gross motor	52.71	9.97	17	10.76%
Fine motor	45.35	14.77	17	10.76%
Problem solving	52.78	10.74	22	13.92%
Personal social	50.34	11.87	14	8.86%
Delays in two or more areas			16	10.13%

Children within the age range of 45 months and one day to 50 months and thirty days were involved in this age interval. As it is shown in the above table, relatively delay in problem solving skills was more prevalent (13.92%) followed by delay in fine and gross motor skills (10.76 % each). The prevalence rate is lower for personal social skills (8.86%) and communication (3.16%). Global developmental delay was exhibited by 10.13% of the children.

4.1.8 Delayed Development in the Overall Age Intervals

In the above tables the prevalence of developmental delays in five developmental domains was presented for different age intervals that were involved in this research. In order to get the overall impression about in which domains of development more delays were exhibited the researcher made an attempt to pool the number of children with delayed development from all age intervals with respect to the developmental domains. The results are presented by bar graph here under.

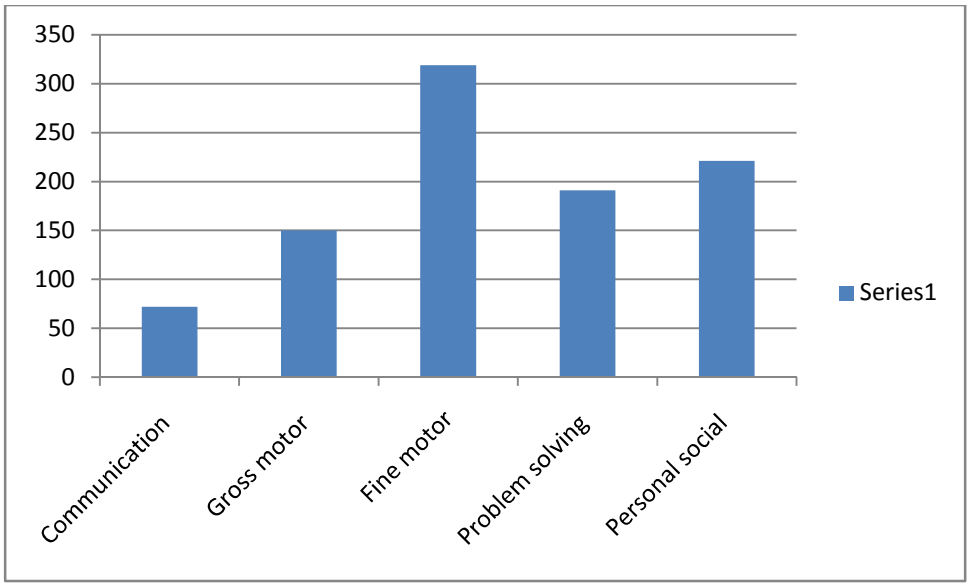

Fig 2. Developmental delays in five domains among infants and young children of Addis Ababa (N=1015)

From the above graph one may see that more delayed development was observed in fine motor skills domain in which 319 children manifested delayed development, which was followed by delayed development in personal social skills domain. In this domain 221 children exhibited delayed development. Besides, 191 children showed delayed development in problem solving skills domain, 150 children manifested delayed development in gross motor skills domain and 72 children showed delayed development in communication domain. To make the data more vivid

the proportion for developmental delays for the developmental domains is presented in the pie chart put in Appendix C. In the chart the biggest share was taken by fine motor domain (30.53%), followed by personal social domain (21.15%), and problem solving domain (18.28%), which were followed by gross motor skills domain (14.35%) and communication domain (6.89%).

In addition to considering developmental delays in specific domains for all age categories involved in this study an attempt was made to determine the number of children who exhibited delayed development in two or more domains of development. These numbers were presented in each table depicting developmental delay for each age category. Taking the numbers from all the tables shown, it gives 294. These 294 infants and young children manifested delayed development in two or more areas, which gives the prevalence rate of 28.13%. In other words 28.13% of infants and young children who took part in this study were found to have global developmental delay.

In order to see global developmental delay in each age category with respect to the sexes the researcher has put the findings in the following table.

Table 8

Global Developmental Delay with Respect to the Sexes

Age Category	Gender	With GDD*		Without GDD	
		N	%	N	%
9 Months	Male	19	30.16	44	69.84
	Female	11	18.33	49	81.67
12 Months	Male	28	38.89	44	61.11
	Female	29	36.71	50	63.29
18 Months	Male	29	32.95	59	67.05
	Female	26	39.39	40	60.61
24 Months	Male	38	45.24	46	54.76
	Female	23	32.86	47	67.14
30 Months	Male	16	21.33	59	78.67
	Female	12	15.38	66	84.62
36 Months	Male	22	31.43	48	68.57
	Female	22	26.83	60	73.17
48 Months	Male	9	11.25	71	88.75
	Female	7	8.97	71	91.03

Note: * GDD stands for global developmental delay

In the above table it is shown that the proportion of male infants and young children with global developmental delay was higher compared to female infants and young children in all age categories except one age category. This exception was the proportion of females in the age category of 18 months which was a bit higher from the proportion of males.

4.2 Assessment of Risk Factors Associated with Developmental Delays

In this descriptive survey research different risk factors presumed to be associated with developmental delays were assessed. The risk factors assessed in this study include level of maternal education, maternal age at the time of the child's birth, birth weight of developmentally delayed child, physical abuse and neglect, child's sex, the availability of playing materials and stimulating home environment, illness of the child, the history of congenital hearing impairment on parent or parents, family size and the level of household income. To make the presentation of the results easy the researcher handled these risk factors as they happen to contribute for developmental delays of children in different age intervals treated in this investigation.

4.2.1 9 Months Old Infants

Table 9

Maternal, Child and Home Related Risk Factors of 9 Months Old Infants

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	36	29.3
	Elementary education	32	26
	High school and preparatory education	39	31.7
	College diploma or degree	16	13
Maternal Age	Between 20 to 34 years of age	112	92.6
	19 years and below and 35 years and above	9	7.4
Child's Birth Weight	2.5 kilo grams and above	100	81.3
	2.1 to 2.4 kilo grams	20	16.3
	1 to 2 kilo grams	3	2.4
Physical Punishment	Do not use physical punishment	106	86.2
	Use physical punishment	17	13.8
Availability of Playing Materials	Adequately available	18	14.6
	Partly available	45	36.6
	Not available	60	48.8
Income Level	1000 birr or less monthly	85	69.2
	1001 to 2000 birr	17	13.8
	2001 to 3000 birr	11	8.9
	3001 birr per month and above	10	8.1
Sex of Infants	Male	63	51.2
	Female	60	48.8
Illness of Children	Experienced illness	40	32.5
	Did not experience illness	83	67.5
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	121	98.4
	Parents who experienced it	2	1.6
Family Size	3 or less family members	40	32.5
	4 or more family members	83	67.5

From the above table, it is possible to see that a large number of mothers of 9 months old infants were at high school and preparatory education level (31.7%) and the second place was taken by mothers who do not read and write (29.3%). The share of mothers with college diploma or degree was 13% and the remaining share was taken by mothers with elementary level education.

Concerning maternal age the above table clearly shows that the largest number of mothers of infants in this interval was in the age range between 20 to 34 years (92.6%) and the smaller number went to mothers who were 19 years or younger and 35 years or older (7.4%) at the time of the assessed child's birth.

In the above table it is also shown that the majority (81.3%) of infants of this interval weighed 2.5 kilo grams or above at the time of birth and lesser proportions were taken by those who weighed 2.4 kilo grams or less at the time of birth.

As far as the use of physical punishment is concerned the above table shows that large number of parents reported that they did not resort to corporal punishment in rearing their children while the small number of parents reported that they tend to use physical punishment in disciplining their children.

Concerning the availability of playing materials the above table shows that for the large number of infants playing materials were not as such available whereas for some infants the playing materials were either partly (36.6%) available or adequately available (14.6%).

Regarding family income in the above table it is depicted that the majority (69.2%) of the parents earned 1000 birr or less monthly and those who earned more than 3000 birr monthly were only 8.1%. Those parents who earned between 1000 and 3000 birr comprised 22.7%. The

above table also shows that from the infants involved in the study 63 (51.2%) were males and 60 (48. 8%) were females.

From the above table it is also possible to see that about two-third of the infants involved in the research did not experience illness for several months before the survey while the remaining one third experienced illness (32.5%). Regarding parental congenital hearing impairment from the table one may see that almost all parents who participated in the research did not experience congenital hearing impairment with the exception of 2 (1.6%). Concerning family size the above table shows that in the majority (67.5%) of the households the number of members exceeds 4 and above and in 32.5% of the households the family size was 3 or less.

4.2.1.1 The Association of the Risk Factors with Global Developmental Delay of 9 Months Old Infants

In order to assess the association of the risk factors with global developmental delay of 9 months old infants logistic regression analysis was conducted by taking being globally delayed as dependent variable and the risk factors shown above as independent variables. The results of the analysis are shown here under.

Table 10

Results of Logistic Regression Analysis for 9 Months Old Infants

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	0.279	0.497	0.316	1	0.574	1.322
Maternal Education	-0.043	0.305	0.020	1	0.887	0.958
Maternal Age	1.983	0.915	4.699	1	0.030	7.264
Birth Weight	0.141	0.518	0.074	1	0.786	1.151
Physical Punishment	1.663	0.698	5.678	1	0.017	5.276
Playing Materials	1.005	0.473	4.524	1	0.033	2.733
Family Income	-0.110	0.338	0.105	1	0.746	0.896
Exposure to Illness	0.584	0.517	1.275	1	0.259	1.794
History of Hearing Problems	-20.188	2.701E4	.000	1	0.999	.000
Family Size	0.246	0.509	0.235	1	0.628	1.279
Constant	-3.066	1.002	9.365	1	0.002	0.047

The above table shows the results of logistic regression analysis and we may see from the table that some of the independent variables were significantly associated with the dependent variable while other variables were not significantly associated with the dependent variable. In the table the column denoted by Exp (B) represents the odds ratio. Accordingly, the odds ratio for females to be globally delayed was 1.322 times greater than that of males. However, as this

result was not statistically significant what we observed here was not different from an observation that occurred by chance alone. Similarly, for one unit change in maternal education the odds of being in globally delayed group decreases by the factor of 0.958. But still this result was not statistically significant. On the other hand, for one unit change in maternal age the odds of being in globally delayed group increases by the factor of 7.264 which was statistically significant at 0.05 alpha level with 95% confidence interval of 1.209 to 43.633. Concerning birth weight one unit change in this variable was associated with 1.151 times increase for being in a globally delayed group yet the result was not statistically significant. Physical punishment was another independent variable that was significantly associated with the dependent variable at 0.05 level with 95% confidence interval of 1.343 to 20.720. In this case one unit change in applying physical punishment increases the odds of being in globally delayed group 5.276 times. The other variable that was significantly associated with the dependent variable for this age group was the availability of playing materials. For one unit change in this variable the odds of being in globally delayed group increases by the factor of 2.733, which is significant at 0.05 level with 95% confidence interval of 1.082 to 6.901. For the family income, the obtained odds ratio was not statistically significant. Though one unit change in family income was seen to bring decrease of being in a globally delayed group as the obtained odds ratio was 0.896. On the other hand, for one unit change in exposure to illness the odds of being in a globally delayed group increases by the factor of 1.794. Yet this ratio is also not statistically significant. Parental history of having congenital hearing impairment appears to have no contribution in predicting global developmental delay. Regarding family size, for one unit change in family size the odds of being

in a globally delayed group increases by the factor of 1.279. However, this result is also not statistically significant.

To complement on what has been done through logistic regression analysis it seemed proper to carryout MANOVA to see how independent variables contributed to differences in mean scores on developmental domains for different groups. To manage the presentation and not to make it cumbersome only those with significant contributions were shown in the table.

Table 11

Results of MANOVA for 9 Months Age Interval

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Maternal Education	Gross Motor Skills	3069.604	3	1023.201	3.341	0.026
Physical Punishment	Gross Motor Skills	2758.490	1	2758.490	9.006	0.004
Physical Punishment	Fine Motor Skills	1404.399	1	1404.399	5.242	0.023
Availability of playing Materials	Personal Social Skills	2385.459	2	1192.729	4.572	0.010
Income	Gross Motor Skills	2699.003	3	899.668	2.937	0.041

As it is presented in the above table some of the independent variables were significantly contributing on the scores of infants in the developmental domains shown. The independent variables entered the model were sex, maternal education, maternal age, birth weight, application of physical punishment, availability of playing materials, monthly income, exposure of infants to illness, parental developmental problems, and family size. From all these independent variables the variables shown in the table such as maternal education, physical punishment, availability of playing materials and income were seen to significantly contribute on the scores of gross and fine motor skills and personal social skills. Post hoc test was carried out for the variables which were found to be significant. In this regard as maternal education was significant for scores in gross motor domain an attempt was made to see for which group the mean was high and significantly different from others. In this regard the means for illiterate group (39.063) and for high school and preparatory education group (38.649) were high compared to those in elementary education (35.000) and diploma, degree and above degree group (27.188). For physical punishment as we had two groups post hoc test cannot be performed as the procedures require more than two groups to conduct post hoc test. Yet the researcher applied independent sample t-test to see the mean differences between those who applied physical punishment and not applied physical punishment in connection to the scores on gross motor skills. The mean for the group which did not apply physical punishment was 37.547 with the standard deviation 18.248 and for the group that did use physical punishment the mean was 27.813 with the standard deviation 16.224. The t-value obtained was 2.016 which is significant at 0.05 alpha level. Regarding availability of playing materials, as shown above this variable was found to be significant in contributing for personal social scores. From the three groups the group having full

access to playing materials had the mean score 43.611 which was significantly different from those having partial access to playing materials (38.954) and those with no access to playing materials (34.167). As far as the variable monthly income is concerned it was found significant for gross motor scores and those in high earning group meaning earning 2001 birr to 3000 birr group (41.818) and earning 3001 birr and above group (41.111) were found to be significantly different from those earning 1001 birr to 2000 birr (29.688) and those who earn 1000 birr and less monthly (36.203).

When all the independent variables were entered the model the R^2 resulted was 0.111 and the adjusted R^2 was 0.024 for communication scores. This value was 0.215 (the adjusted one 0.096) for gross motor scores. For fine motor scores the value was 0.177 (adjusted 0.043) and for problem solving it was 0.168 (adjusted 0.041). The coefficient of determination for personal social score was 0.151 (adjusted 0.023).

4.2.2 Infants in 12 Months Age Interval

Table 12

Maternal, Child and Home Related Risk Factors of Infants in 12 Months Age Interval

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	28	21.4
	Elementary education	59	45
	High school and preparatory education	34	26
	College diploma or degree	10	7.6
Maternal Age	Between 20 to 34 years of age	120	91.6
	19 years and below and 35 years and above	11	8.4
Child's Birth Weight	2.5 kilo grams and above	97	74
	2.1 to 2.4 kilo grams	30	23
	1 to 2 kilo grams	4	3
Physical Punishment	Do not use physical punishment	107	81.7
	Use physical punishment	24	18.3
Availability of Playing Materials	Adequately available	11	8.4
	Partly available	49	37.4
	Not available	71	54.2
Income Level	1000 birr or less monthly	100	76.3
	1001 to 2000 birr	23	17.6
	2001 to 3000 birr	6	4.6
	3001 birr per month and above	2	1.5
Sex of Infants	Male	62	47.3
	Female	69	52.7
Illness of Children	Experienced illness	70	48.4
	Did not experience illness	81	53.6
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	149	98.7
	Parents who experienced it	2	1.3
Family Size	3 or less family members	39	29.7
	4 or more family members	92	70.3

It is shown in the above table that the majority (45%) of the mothers/care givers of infants of this age interval had elementary level education. Those with high school and preparatory education comprised 26% and the mothers/care givers do not read and write comprised 21.4%. Mothers/care givers with college level education were very few (7.6%).

In the above table it is also presented that 91.6% of the mothers of the infants were in the age range of 20 to 34 years and only 8.4% of the mothers were either 19 or less and 35 years or more at the time of an assessed child birth.

As far as birth weight is concerned the above table shows that the greatest share was taken by infants who weighed 2.5 kilo grams or above which was 74%. On the other hand infants who weighed 2.4 kilo grams or less comprised 26%.

Regarding parents/care givers use physical punishment in disciplining their children, the majority (81.7%) reported that they did not turn to physical punishment to discipline their children. However, 18.3% of the participants reported that they did use physical punishment in disciplining their children.

From the above table it is also possible to see that infants who did get adequate playing materials were low in proportion (8.4%) compared to those whose environment was partly furnished with playing materials (37.4%) and not equipped with playing materials (54.2%).

In the above table it is depicted that more than three fourth of the households involved in this study earned 1000 birr or less monthly. The households earned above 2001 birr comprised only 6.1%. The family that earned between 1001 and 2000 birr comprised 17.6%. Regarding sex of the infants it is shown in the above table that 52.3% of the infants involved in this study from this age group were females while the remaining 47.7% were male infants.

From the above table one may see that infants who did not experience illness for some months prior to survey were a bit greater than (53.6%) those who did experience illness (48.4%).

Concerning parental congenital hearing impairment the above table shows that almost all (98.7%) of the parents involved in the study did not have the history of congenital hearing impairment with the exception of 2 cases who reported that either parent had history of congenital hearing impairment. From the above table we also see that in the majority (70.3%) of the households the number of residents exceeds 4 or more where as in 29.3% of the households the number of members was 3 or less.

4.2.2.1 The Association of the Risk Factors with Global Developmental Delay of Infants in 12 Months Age Interval

As it was computed for 9 months age group, logistic regression analysis was carried out for this age group too and the results are shown in the following table.

Table 13

Results of Logistic Regression Analysis for 12 Months Age Interval

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	0.299	0.413	0.522	1	0.470	1.348
Maternal Education	0.102	0.267	0.146	1	0.702	1.108
Maternal Age	-0.507	0.747	0.460	1	0.498	0.602
Birth Weight	0.145	0.420	0.119	1	0.730	1.156
Physical Punishment	0.844	0.512	2.719	1	0.099	2.325
Playing Materials	0.792	0.396	3.997	1	0.046	2.208
Family Income	-0.463	0.296	2.440	1	0.118	0.629
Exposure to Illness	0.643	0.444	2.099	1	0.147	1.901
History of Hearing Impairment	-21.703	4.019E4	.000	1	1.000	.000
Family Size	0.050	0.459	0.012	1	0.914	1.051
Constant	-1.385	0.886	2.443	1	0.118	0.250

From the table it is possible to see that most of the independent variables were not statistically significantly contributing to the prediction of global developmental delay. However, to see the odds ratio of each of the independent variables sex of infants had the odds ratio of 1.348. This means being of female sex increases the odds of being in a globally delayed group by a factor of 1.348. Though, as the result is not statistically significant, it is not different from what we would

observe merely by chance. Concerning maternal education, for one unit change in maternal education, the odds of being in a globally delayed group increases by the factor of 1.108. On the other hand, for one unit change in maternal age the odds of being in a globally delayed group decreases by the factor of 0.602. Regarding birth weight, for one unit change in birth weight the odds of being in a globally delayed group increases by the factor of 1.156. Yet all the odds ratio showed are not statistically significant. The same is true also about application of physical punishment. For one unit change in the application of physical punishment the odds of being in a globally delayed group increases by the factor of 2.325. The independent variable availability of playing materials was found to be statistically significant at 0.05 level with 95% confidence interval of 1.016 to 4.799. The odds ratio of this variable is 2.208. This means for one unit change in this independent variable the odds of being in a globally delayed group increases by the factor of 2.208. The odds ratio for family income level is 0.629. This shows for one unit change in family income level the odds of being in a globally delayed group decreases by the factor of 0.629. Concerning exposure to illness, for one unit change in exposure to illness the odds of being in a globally delayed group increases by the factor of 1.901. History of parental congenital hearing impairment seems to have no contribution regarding the occurrence of global developmental delay. Finally, for one unit change in family size the odds of being in a globally delayed group increases by the factor of 1.051.

As it was done for the age group above MANOVA was carried out for this age group too and the results are shown in the following table.

Table 14

Results of MANOVA for 12 Months Age Interval

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Maternal Education	Gross Motor Skills	3146.697	3	1048.899	3.382	0.020
Maternal Education	Fine Motor Skills	2421.599	3	807.200	3.058	0.039
Playing Materials	Problem Solving Skills	2107.344	2	1053.672	3.652	0.034
Playing Materials	Personal Social Skills	2860.507	2	1430.254	4.576	0.015
Income	Fine Motor Skills	2580.065	3	860.022	3.258	0.028
Income	Problem Solving Skills	4331.110	3	1443.703	5.004	0.003
Exposure to Illness	Fine Motor Skills	2136.083	1	2136.083	8.093	0.007

In the above table it is shown that some of the independent variables were found to be significantly contributing on the scores of different developmental domains. As a result from all independent variables entered the model maternal education, availability of playing materials, level of family income and infants' exposure to illness were found to be significant either at 0.01 or 0.05 alpha level. For instance maternal education was found to be significantly contributing for the scores on gross motor and fine motor domains whereas availability of playing materials was found to be significantly contributing to the scores of problem solving and personal social domains. Similarly, family monthly income was found to be important in the development of fine motor and problem solving skills. Finally, exposure to illness was seen to contribute significantly to fine motor scores. Post hoc tests were performed to see which groups' attainments were better on the developmental domains indicated. In this regard infants from mothers who had high school and preparatory level of education scored far better on gross motor domain with the mean 46.667 compared to those infants who had mothers with diploma, degree and above degree level of education (30.000). The performance of the former group was also far better compared to the attainment of infants who had mother with elementary level education as well (38.529). In the same way infants of mothers with high school and preparatory education showed higher score compared to others on fine motor domain. In relation to the availability of playing materials the infants from homes with adequate playing materials scored better in problem solving and personal social tasks compared to those who did not have access to playing materials. Regarding monthly income infants from high earning group scored better in fine motor and problem solving domains compared to other groups. As post hoc test cannot be carried out for exposure to illness as the groups were only two to check the means of the two groups

independent groups t-test was performed and infants who experienced illness were seen to score significantly less (28.714) than those who did not experience illness (40.185). The obtained t was 4.051 which is significant at 0.001 alpha level.

When all independent variables were entered the model R^2 for communication scores was found to be 0.131 (adjusted 0.005) and for gross motor scores it was 0.155 (adjusted 0.032). This value for fine motor scores was 0.274 (adjusted 0.168), and for problem solving scores the value was 0.216 (adjusted 0.102). Finally, for personal social scores the coefficient of determination was found to be 0.231 (adjusted 0.119).

4.2.3 Infants in 18 Months Age Interval

Table 15

Maternal, Child and Home Related Risk Factors of Infants in 18 Months Age Interval

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	26	19.5
	Elementary education	54	40.6
	High school and preparatory education	38	28.6
	College diploma or degree	15	11.3
Maternal Age	Between 20 to 34 years of age	122	91.7
	19 years and below and 35 years and above	11	8.3
Child's Birth Weight	2.5 kilo grams and above	112	84.2
	2.1 to 2.4 kilo grams	19	14.3
	1 to 2 kilo grams	2	1.5
Physical Punishment	Do not use physical punishment	100	75.8
	Use physical punishment	32	24.2
Availability of Playing Materials	Adequately available	10	7.5
	Partly available	60	45.1
	Not available	63	47.4
Income Level	1000 birr or less monthly	97	72.9
	1001 to 2000 birr	27	20.1
	2001 to 3000 birr	4	3
	3001 birr per month and above	5	4
Sex of Infants	Male	76	57.1
	Female	57	42.9
Illness of Children	Experienced illness	65	42.2
	Did not experience illness	89	57.8
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	152	98.7
	Parents who experienced it	2	1.3
Family Size	3 or less family members	47	36.2
	4 or more family members	83	63.8

The above table shows that more mothers of this group had elementary level education (40.6%) followed by the mothers who had high school and preparatory level education (28.6%). The mothers who were do not read and write in this group comprised 19.5% and those with college diploma, degree or above comprised 11.3%.

The above table also presents the maternal age distribution of infants in 18 months age interval. As one may see from the table the majority of the mothers of infants of this group were in the age range between 20 to 34 years of age (91.7%). The remaining 8.3% were either the mothers who were 19 or younger or 35 or older at the time of the assessed child's birth.

Regarding the child's birth weight the above table depicts infants whose birth weights were 2.5 kilo grams or above became the largest among those involved in this study accounting for 84.2%. The infants whose birth weight was below 2.4 kilo grams comprised only 15.8%.

Concerning the use of physical punishment the above table shows that about three fourth of parents or care givers of infants in this interval did not tend to use physical punishment to discipline their children whereas the remaining one fourth of the parents or care givers reported that they did use physical punishment to discipline their children. Besides other information, the above table shows that for infants in this age interval for most of them playing materials were not available as such (47.4%) and for 45.1% of the infants the playing materials were partly available. Only very small portion of the infants (7.5%) had access to adequate playing materials.

It is shown in the above table that the majority (72.9%) of parents of infants in this age interval earned 1000 birr or less monthly. The parents who earned between 1000 and 2000 birr monthly accounted 20.1%. Those who earned above 2001 birr comprised only 7%. Concerning

the sexes as it is shown in the above table more male (57.1%) infants were involved in the study compared to female infants that accounted 42.9% from this age interval.

From the above table one may also see that about 58% of infants did not experience any illness for some months prior to this survey whereas about 42% of those participated in this research experienced illness. As shown above almost all the parents of infants in this age interval did not experience congenital hearing impairment as the proportion was 98.7% to 1.3%. Hence negligible proportion of parents experienced congenital hearing impairment.

In the above table it is depicted that more infants were from households with 4 members or more that accounted 63.8%. On the other hand about 36.2% of the households from which infants were drawn resided with 3 or less members.

4.2.3.1 The Association of the Risk Factors with Global Developmental Delay of Infants in 18 Months Age Interval

As it was computed for 9 and 12 months age intervals, logistic regression analysis was carried out for this age group too and the results are shown in the following table.

Table 16

Results of Logistic Regression Analysis for 18 Months Age Group

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	-0.254	0.426	0.354	1	0.552	0.776
Maternal Education	0.266	0.253	1.105	1	0.293	1.304
Maternal Age	-1.213	0.864	1.975	1	0.160	0.297
Birth Weight	0.928	0.531	3.057	1	0.080	2.530
Physical Punishment	0.185	0.512	0.131	1	0.718	1.204
Playing Materials	0.008	0.376	0.000	1	0.983	1.008
Family Income	0.151	0.349	0.188	1	0.665	1.163
Exposure to Illness	0.875	0.416	4.438	1	0.035	2.400
History of Hearing Impairment	0.578	1.584	0.133	1	0.715	1.782
Family Size	0.331	0.445	0.554	1	0.457	1.393
Constant	-1.949	0.958	4.134	1	0.042	0.142

In the above table it is indicated that most of the independent variables were not statistically significantly contributing to the prediction of global developmental delay. However, to see the odds ratio of each of the independent variables sex of infants had the odds ratio of 0.776. This means being of female sex decreases the odds of being in a globally delayed group by a factor of 0.776. Though, as the result is not statistically significant, it is not different from what we would

observe merely by chance. Concerning maternal education, for one unit change in maternal education, the odds of being in a globally delayed group increases by the factor of 1.304. On the other hand, for one unit change in maternal age the odds of being in a globally delayed group decreases by the factor of 0.297. Regarding birth weight, for one unit changes in birth weight the odds of being in a globally delayed group increases by the factor of 2.530. Yet the entire odds ratios shown are not statistically significant. The same is true also about application of physical punishment. For one unit change in the application of physical punishment the odds of being in a globally delayed group increases by the factor of 1.204. In the same way for the availability of playing materials the odds ratio is 1.008. This means for one unit change in this independent variable the odds of being in a globally delayed group increases by the factor of 1.008. The odds ratio for family income level is 1.163. This shows for one unit change in family income level the odds of being in a globally delayed group increases by the factor of 1.163. The variable exposure to illness was found to be statistically significant at alpha 0.05 level with 95% confidence interval of 1.063 to 5.418. As it was shown in the table for this variable for one unit change the odds of being in a globally delayed group increases by the factor of 2.400. The independent variable history of parental hearing impairment had the odds ratio of 1.782. This shows for one unit change in this independent variable the odds of being in a globally delayed group increases by the factor of 1.782. Finally, for one unit change in family size the odds of being in a globally delayed group increases by the factor of 1.393. However, except for one independent variable as shown all others are not statistically significant in contributing for the predication of global developmental delay for this age interval.

As it was done for the age intervals above MANOVA was carried out for this age group too and the results are shown in the following table.

Table 17

Results of MANOVA for 18 Months Age Interval

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Physical Punishment	Personal Social Skills	520..400	1	520.400	4.138	0.044
Income	Communication Skills	1861.517	3	620.506	2.865	0.040
Exposure to Illness	Communication Skills	4629.787	1	4629.787	21.269	0.000
Exposure to Illness	Gross Motor Skills	1609.964	1	1609.964	10.367	0.001
Exposure to Illness	Fine Motor Skills	1832.966	1	1832.966	4.724	0.037

It was indicated in the above table that three variables were found to be significant for infants of this age interval. These variables were use or non-use of physical punishment, level of family income and infants' exposure to illness which were found to be significantly contributing on the scores of communication, gross motor, and fine motor and personal social domains. To see how

different group performed in relation to the variables post hoc test was conducted. This was especially done to evaluate the contribution of having different levels of income on communication scores of the children. In this regard the highest mean score was scored by infants who were from the family who earned 2,001 to 3,000 birr whose mean score was 48.75 and the lowest mean score was obtained by infants from the highest earning group that was 31.00. It is seen that the difference is significant and we would say that level of income significantly contributed to differences in communication scores of the infants. In relation to other variables as the groups were two to evaluate these variables independent samples t-test was carried out. In connection to communication scores infants who did not experience illness scored better with the mean 45.674 with standard deviation 14.106 compared to those who did experience illness (mean 35.692 and standard deviation 17.520). The t-value obtained for the mean score difference is 3.913 which is significant at 0.001 alpha level. In the same way infants who did not experience illness scored better on gross motor tasks and their mean was 52.303 with standard deviation 8.662. Those infants who did experience illness scored less and their mean was 44.923 with the standard deviation 14.935. For mean score difference the obtained t-value was 3.860 which is significant at 0.001 alpha level. Similarly, the groups' performance was significantly different on fine motor domain. The mean score for infants who did not experience illness was 32.416 with the standard deviation 18.326 and for infants who did experience illness the mean score was 25.923 with the standard deviation 17.159. The t-value obtained for mean difference was 2.230 which is significant at 0.05 alpha level.

Even though most of the independent variables were not as such significantly contributing to the scores of developmental domains to see R^2 for communication scores the R^2 was found to be

0.300 (adjusted 0.199), for gross motor scores the value was 0.202 (adjusted 0.087) and for fine motor scores the value was 0.092 (adjusted 0.039). For the remaining two outcome variables for problem solving the value was 0.070 (adjusted 0.064) and for personal social scores R^2 was 0.153 (adjusted 0.031).

4.2.4 Infants in 24 Months Age Interval

Table 18

Maternal, Child and Home Related Risk Factors of Infants in 24 Months Age Interval

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	33	25
	Elementary education	43	32.6
	High school and preparatory education	38	28.8
	College diploma or degree	18	13.6
Maternal Age	Between 20 to 34 years of age	118	89.4
	19 years and below and 35 years and above	14	10.6
Child's Birth Weight	2.5 kilo grams and above	102	77.3
	2.1 to 2.4 kilo grams	25	18.9
	1 to 2 kilo grams	5	3.8
Physical Punishment	Do not use physical punishment	77	58.8
	Use physical punishment	54	41.2
Availability of Playing Materials	Adequately available	13	10
	Partly available	45	34
	Not available	74	56
Income Level	1000 birr or less monthly	92	69.7
	1001 to 2000 birr	17	12.9
	2001 to 3000 birr	12	9.1
	3001 birr per month and above	11	8.3
Sex of Infants	Male	84	54.5
	Female	70	45.5
Illness of Children	Experienced illness	68	44.2
	Did not experience illness	86	55.8
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	151	98.1
	Parents who experienced it	3	1.9
Family Size	3 or less family members	37	28
	4 or more family members	95	72

The above table shows that more mothers of infants of this age interval had elementary level education (32.6%) followed by those who had high school and preparatory level education (28.8%). The mothers who had college diploma or above comprised 13.6% while those who do not read and write accounted 25%.

As far as maternal age is concerned the above table shows that the majority (89.4%) of mothers of infants of this age interval was in the age group between 20 to 34 years of age and the remaining were aged 19 or less or 35 years or more at the time of an assessed child's birth. Concerning the child's birth weight the above table depicts that 77.3% of infants of this age group weighed 2.5 kilo grams or above at the time of birth and the infants who weighed 2.4 kilo grams or less accounted 22.7%.

The above table also shows that more (58.8%) parents or care givers reported that they did not use physical punishment while raising their children whereas considerable number (41.2%) of parents or care givers indicated that they used physical punishment while raising their children.

From the above table one may also see that for more than half (56%) of infants involved in this study playing materials were not as such available and for 34% of infants the playing materials were partly available. This survey showed that from infants in this age group only 10% had adequate playing materials in their disposal.

In the above table it is shown that the majority of parents of infants in 24 months age group earned 1000 birr or less monthly that comprised 69.7% and those who earned between 1000 to 2000 birr accounted 12.9%. Parents who earned above 2001 birr comprised for about 17.4%. Regarding sex distribution the above table depicts that more (54.5%) male infants were involved in this study from this age interval compared to female infants (45.5%).

In the above table it is shown that somehow more (55.8%) infants did not experience illness for some months prior to the survey and substantial number (44.2%) of infants experienced illness before the time of the survey. As far as parental congenital hearing impairment is concerned one may see from the above table that almost all (98.1%) of the parent or parents did not experience congenital hearing impairment whereas only 1.9% of the infants' parent/s had experienced congenital hearing impairment. The above table also shows that more households where the infants of 24 months age interval lived inhabited by 4 or more members that accounted 72%. On the other hand the households that were inhabited by 3 or less members comprised 28%.

4.2.4.1 The Association of the Risk Factors with Global Developmental Delay of Infants in 24 Months Age Interval

As it was computed for the other age intervals above, logistic regression analysis was carried out for this age segment too and the results are shown in the following table.

Table 19

Results of Logistic Regression Analysis for 24 Months Age Group

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	0.627	0.430	2.120	1	0.145	1.872
Maternal Education	0.407	0.237	2.936	1	0.087	1.502
Maternal Age	-0.362	0.708	0.263	1	0.608	0.696
Birth Weight	0.375	0.381	0.967	1	0.326	1.454
Physical Punishment	0.389	0.422	0.848	1	0.357	1.475
Playing Materials	0.559	0.390	2.060	1	0.151	1.749
Family Income	0.016	0.264	0.003	1	0.953	1.016
Exposure to Illness	-0.712	0.433	2.712	1	0.100	0.491
History of Hearing Impairment	-0.995	1.343	0.548	1	0.459	0.370
Family Size	-0.039	0.465	0.007	1	0.932	0.961
Constant	-2.222	0.800	7.714	1	0.005	0.108

In the above table it is indicated that all of the independent variables were not statistically significantly contributing to the prediction of global developmental delay. However, to see the odds ratio of each of the independent variables sex of infants had the odds ratio of 1.872. This means being of female sex increases the odds of being in a globally delayed group by a factor of 1.872. But as the result is not statistically significant, it is not different from what we would

observe merely by chance. Concerning maternal education, for one unit change in maternal education, the odds of being in a globally delayed group increases by the factor of 1.502. On the other hand, for one unit change in maternal age the odds of being in a globally delayed group decreases by the factor of 0.696. Regarding birth weight, for one unit change in birth weight the odds of being in a globally delayed group increases by the factor of 1.454. Yet all the odds ratios showed are not statistically significant. The same is true also about application of physical punishment. For one unit change in the application of physical punishment the odds of being in a globally delayed group increases by the factor of 1.475. In the same way for the availability of playing materials the odds ratio is 1.749. This means for one unit change in this independent variable the odds of being in a globally delayed group increases by the factor of 1.749. The odds ratio for family income level is 1.016. This shows for one unit change in family income level the odds of being in a globally delayed group increases by the factor of 1.016. The variable exposure to illness was found to have the odds ratio of 0.491. This means for one unit change in exposure to illness the odds of being in a globally delayed group decreases by the factor of 0.491. The independent variable history of parental hearing impairment had the odds ratio of 0.370. This shows for one unit change in this independent variable the odds of being in a globally delayed group decreases by the factor of 0.370. Finally, for one unit change in family size the odds of being in a globally delayed group increases by the factor of 0.961. However, as shown all the independent variables are not statistically significant in contributing to the predication of global developmental delay for this age group.

As it was done for the age intervals above MANOVA was carried out for this age group too and the results are shown in the following table.

Table 20

Results of MANOVA for 24 Months Age Interval

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Maternal Education	Communication Skills	1516.306	3	505.435	3.505	0.022
Maternal Education	Fine Motor Skills	1952.402	3	650.801	3.498	0.026
Birth Weight	Problem Solving Skills	1476.519	2	738.260	4.112	0.042
Income	Fine Motor Skills	1949.857	3	649.952	3.494	0.023
Exposure to Illness	Fine Motor Skills	949.810	1	949.810	5.106	0.034
Family Size	Communication Skills	750.237	1	750.237	5.203	0.025

As one may see from the above table from the variables entered the model maternal education, birth weight, family income, exposure to illness and family size were found to be significant for this age group. In this connection maternal education was found to be significant for communication and fine motor domains while birth weight was found to be significant in

problem solving domain. Similarly, level of family income was found to be important in fine motor domain and exposure to illness was seen to be significant in this domain too. Finally, family size was found to be significant for performance in communication domain. The post hoc test showed that infants of mothers who had high school and preparatory level of education performed better on communication tasks compared to the other groups. On the other hand infants of mothers who had elementary level of education performed better on fine motor tasks compared to others. As far as birth weight was concerned infants who weighed 2.5 kilo grams and above performed better on problem solving tasks compared to groups especially those who weighed 2.1 to 2.4 kilo grams. Regarding level of family income infants from high earning group did score better on fine motor tasks compared to others.

When all independent variables were entered the model their contribution on scores of dependent variables were found as follows. For communication scores R^2 obtained was 0.174 (adjusted 0.054), for gross motor scores the value was 0.107 (adjusted 0.022) and for fine motor scores the value obtained was 0.212 (adjusted 0.099). In the same way the obtained R^2 for problem solving scores was 0.198 (adjusted 0.082) and for personal social scores the value obtained was 0.190 (0.073).

4.2.5 Young Children in 30 Months Age Interval

Table 21

Maternal, Child and Home Related Risk Factors of Young Children in 30 Months Age Interval

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	27	20.6
	Elementary education	50	38.2
	High school and preparatory education	39	29.8
	College diploma or degree	15	11.5
Maternal Age	Between 20 to 34 years of age	120	91.6
	19 years and below and 35 years and above	11	8.4
Child's Birth Weight	2.5 kilo grams and above	114	87
	2.1 to 2.4 kilo grams	16	12
	1 to 2 kilo grams	1	1
Physical Punishment	Do not use physical punishment	86	65.6
	Use physical punishment	45	34.4
Availability of Playing Materials	Adequately available	18	13.7
	Partly available	47	35.9
	Not available	66	50.4
Income Level	1000 birr or less monthly	99	75.7
	1001 to 2000 birr	17	12.9
	2001 to 3000 birr	7	5.3
	3001 birr per month and above	8	6.1
Sex of Infants	Male	75	49
	Female	78	51
Illness of Children	Experienced illness	53	34.9
	Did not experience illness	99	65.1
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	151	99.3
	Parents who experienced it	1	0.7
Family Size	3 or less family members	41	31.3
	4 or more family members	90	68.7

It is possible to see from the above table that a majority (38.2%) of mothers of young children in this age interval were with elementary level education followed by mothers having high school and preparatory level education (29.8%). Significant number of mothers was found to be not able to read and write (20.6%) and those with college diploma, degree or above found to be 11.5%.

From the above table one may possibly see that the majority (91.6%) of mothers of infants of this age group was in the age category between 20 to 34 years of age and the remaining were aged 19 or less or 35 years or more at the time of an assessed child's birth. Concerning birth weight the above table depicts that most (87%) of young children in this age group weighed 2.5 kilo grams or above at the time of birth and those who weighed below 2 kilo grams were found to be only 1%. Young children who weighed between 2.1 to 2.4 kilo grams were found to be 12% of the children who took part in this survey.

The above table also shows that about two third of the parents or care givers of young children in 30 months age interval reported that they did not use physical punishment to discipline their children. On the other hand, about one third of the parents reported that they used physical punishment in disciplining their children.

Regarding the availability of playing materials one may see from the above table that half of young children involved in this study did not have access to adequate playing materials and 36% of the children lived in the homes where playing materials were partly available. Young children who enjoyed full access to adequate playing materials comprised 14% for this age interval.

As shown in the above table about three fourth of parents of young children in this age interval earned 1000 birr or less monthly and those earned between 1000 to 2000 accounted for

12.9%. Parents who earned more than 2001 were found to be 11.4% from those all who participated in this research. The above table also shows that a bit more females were involved in the study compared to males. The females accounted for 51% while the remaining portion was taken by males.

In the above table it is shown that somehow more (65.1%) infants did not experience illness for some months prior to the survey and considerable number (34.9%) of infants experienced illness prior to the time of the survey. Concerning parental congenital hearing impairment one may see from the above table that almost all (99.3%) of the parent or parents did not experience congenital hearing impairment whereas only 0.7% of the children's parent/s had experienced congenital hearing impairment.

The majority of the households where young children in 30 months age group lived resided with 4 or more members, which accounted for 68.7%. On the other hand 31.3% of the households resided with 3 or less members.

4.2.5.1 The Association of the Risk Factors with Global Developmental Delay of Young Children in 30 Months Age Category

As it was computed for all the age intervals shown above, logistic regression analysis was carried out for this age group too and the results are shown in the following table.

Table 22

Results of Logistic Regression Analysis for 30 Months Age Interval

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	0.463	0.532	0.758	1	0.384	1.589
Maternal Education	0.375	0.347	1.172	1	0.279	1.456
Maternal Age	0.473	0.887	0.284	1	0.594	1.604
Birth Weight	1.529	0.598	6.526	1	0.011	4.612
Physical Punishment	-0.448	0.579	0.599	1	0.439	0.639
Playing Materials	0.470	0.468	1.007	1	0.316	1.600
Family Income	0.105	0.541	0.037	1	0.847	1.110
Exposure to Illness	0.561	0.545	1.060	1	0.303	1.752
History of Hearing Impairment	-19.456	4.019E4	0.000	1	1.000	0.000
Family Size	-0.845	0.556	2.305	1	0.129	0.430
Constant	-3.297	1.455	5.137	1	0.023	0.037

In the above table it is presented that most of the independent variables were not statistically significantly contributing to the prediction of global developmental delay. Nevertheless, to see the odds ratio of each of the independent variables sex of infants had the odds ratio of 1.589. This means being of female sex increases the odds of being in a globally delayed group by a factor of 1.589. Even if this is the case as this odds ratio is not statistically significant, it is not

different from what we would observe merely by chance. Concerning maternal education, for one unit change in maternal education, the odds of being in a globally delayed group increases by the factor of 1.456. Similarly for one unit change in maternal age the odds of being in a globally delayed group increases by the factor of 1.604. From the predicator variables entered the model birth weight was found to be statistically significant for this group at 0.01 alpha level with 95% confidence interval of 1.427 to 14.901. For this variable for one unit change the odds of being in a globally delayed group increases by the factor of 4.612. As it is the case for most variables entered the model were not statistically significantly contributing to prediction of global developmental delay the same holds true for the application of physical punishment. For one unit change in the application of physical punishment the odds of being in a globally delayed group decreases by the factor of 0.639. In the same way for the availability of playing materials the odds ratio is 1.600. This means for one unit change in this independent variable the odds of being in a globally delayed group increases by the factor of 1.600. The odds ratio for family income level is 1.110. This shows for one unit change in family income level the odds of being in a globally delayed group increases by the factor of 1.110. As it was shown in the table for exposure to illness for one unit change the odds of being in a globally delayed group increases by the factor of 1.752. The independent variable history of parental hearing impairment seems to have no contribution in the prediction of global developmental delay. Finally, for one unit change in family size the odds of being in a globally delayed group decreases by the factor of 0.430. However, except for one independent variable as shown all others are not statistically significant in contributing to the predication of global developmental delay for this age group.

As it was done for the age intervals above MANOVA was carried out for this age group too and the results are shown in the following table.

Table 23

Results of MANOVA for 30 Months Age Interval

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Birth Weight	Gross Motor Skills	1913.776	2	956.888	5.286	0.006
Birth Weight	Personal Social Skills	2563.627	2	1281.814	6.649	0.002
Physical Punishment	Problem Solving Skills	892.748	1	892.748	6.641	0.013
Exposure to Illness	Communication Skills	510.397	1	510.397	4.108	0.039

It is possible to see from the above table that three independent variables were found to be significant for this age group. In this regard, birth weight was found to be significant in contributing on the scores of gross motor and personal social domains whereas physical punishment was found to be important to the scores in problem solving domain. Exposure to illness was seen to be significantly contributing on the scores of communication domain. To compare the means for parents who did apply physical punishment and who did not apply

physical punishment independent sample t test was conducted. Young children whose parents did not use physical punishment performed better on problem solving domain. Their mean score was 48.721 with the standard deviation 12.083. On the other hand the mean score of children whose parents did use physical punishment was 44.000 with the standard deviation 12.550. The t-value obtained for the mean difference was 2.096 which is significant at 0.05 alpha level.

When all independent variables were entered the model the following coefficients of determination were obtained in relation to the outcome variables. For communication scores R^2 obtained was 0.127 (adjusted 0.002), for gross motor scores the value was 0.169 (adjusted 0.050) and for fine motor scores the value was 0.140 (adjusted 0.017). Similarly, for problem solving score the obtained coefficient of determination was 0.208 (adjusted 0.094) and for personal social scores it was 0.227 (adjusted 0.117).

4.2.6 Young Children in 36 Months Age Interval

Table 24

Maternal, Child and Home Related Risk Factors of Young Children in 36 Months Age Interval

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	38	29
	Elementary education	47	35.9
	High school and preparatory education	33	25.2
	College diploma or degree	13	9.9
Maternal Age	Between 20 to 34 years of age	118	91.5
	19 years and below and 35 years and above	11	8.5
Child's Birth Weight	2.5 kilo grams and above	107	81.7
	2.1 to 2.4 kilo grams	20	15.3
	1 to 2 kilo grams	4	3
Physical Punishment	Do not use physical punishment	65	50.8
	Use physical punishment	63	49.2
Availability of Playing Materials	Adequately available	21	16
	Partly available	42	32.1
	Not available	68	51.9
Income Level	1000 birr or less monthly	82	62.6
	1001 to 2000 birr	24	18.3
	2001 to 3000 birr	13	9.9
	3001 birr per month and above	12	9.2
Sex of Infants	Male	70	46.1
	Female	82	53.9
Illness of Children	Experienced illness	52	34.4
	Did not experience illness	99	65.6
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	148	98
	Parents who experienced it	3	2
Family Size	3 or less family members	28	21.9
	4 or more family members	100	78.1

It is possible to see from the above table that most of the mothers of children in this age interval had elementary level education (35.9%), which was followed by those who did not have any education/ who do not read and write (29%). Those who had high school and preparatory level education comprised 25.2%. The smallest proportion was accounted by mothers who had college diploma, degree or above (9.9%).

From the above table one also may see that the majority (91.5%) of mothers of children of this age category was in the age group between 20 to 34 years of age and the remaining (8.5%) were aged 19 or less or 35 years or more at the time of delayed child birth. Concerning birth weight the table presented above shows that the great majority of young children of this age category weighed 2.5 kilo grams and above at the time of birth, which accounted for 81.7%. The children who weighed 2.1 to 2.4 kilo grams comprised 15.3%, whereas those who weighed 1 to 2 kilograms accounted only 3%.

The above table also shows the number and proportion of parents or care givers who did use physical punishment in raising their children and who did not tend to use physical punishment in raising their children. From the table it is possible to see that approximately the same number of parents or care givers seem to apply (49.2%) and not to apply (50.8%) physical punishment in disciplining their children.

Concerning the availability of playing materials the above table depicts that a bit more than half of young children in this age group did not have necessary playing materials in their home environment. On the other hand a little less than one third of the children involved in this study found to live in home environment partly furnished with playing materials needed for children.

From children who were participated in the research only 16% enjoyed full access to playing materials in their home environment.

As far as family income is concerned the above table shows that monthly income of most of the parents of young children in the age category was 1000 birr or less (62.6%). Those who earned 1000 to 2000 birr monthly accounted for 18.3% and parents who earned 2000 to 3000 comprised 9.9% whereas 9.2% of the parents earned 3001 birr or more monthly. Regarding sex distribution more female young children were involved in this study from this age category that accounted 53.9% and the remaining portion was taken by male young children.

In the above table it is also shown that more (65.6%) children did not experience illness for some months prior to the survey and considerable number (34.4%) of children experienced illness prior to the time of the survey. Concerning parental congenital hearing impairment it is possible to see from the above table that almost all (98%) of the parent/s did not experience congenital hearing impairment whereas only 2% of the infants parent/s had experienced congenital hearing impairment.

As shown in the above table in 78.1% of the households resided by young children in this age group the members living there were found to be 4 or more. In remaining 21.9% of the households the number of members was found to be 3 or less.

4.2.6.1 The Association of the Risk Factors with Global Developmental Delay of Young Children in 36 Months Age Category

As it was computed for all the age intervals shown above, logistic regression analysis was carried out for this age segment too and the results are shown in the following table.

Table 25

Results of Logistic Regression Analysis for 36 Months Age Group

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	-0.659	0.504	1.712	1	0.191	0.517
Maternal Education	0.334	0.353	0.896	1	0.344	1.397
Maternal Age	0.901	0.829	1.183	1	0.277	2.462
Birth Weight	-1.020	0.577	3.122	1	0.077	0.361
Physical Punishment	-0.049	0.495	0.010	1	0.921	0.952
Playing Materials	1.014	0.483	4.412	1	0.036	2.758
Family Income	-0.147	0.289	0.257	1	0.612	0.864
Exposure to Illness	0.801	0.492	2.654	1	0.103	2.227
History of Hearing Impairment	24.086	4.019E4	0.000	1	1.000	2.885E10
Family Size	-1.307	0.598	4.772	1	0.029	0.271
Constant	-1.798	0.927	3.762	1	0.052	0.166

One may see from the above table that most of the independent variables were not statistically significantly contributing to the prediction of global developmental delay. In spite of this fact, to see the odds ratio of each of the independent variables sex of infants had the odds ratio of 0.517. This means being of female sex decreases the odds of being in a globally delayed group by a factor of 0.517. Even if this is the case as this odds ratio is not statistically significant, it is not

different from what we would observe merely by chance. Concerning maternal education, for one unit change in maternal education, the odds of being in a globally delayed group increases by the factor of 1.397. Similarly, for one unit change in maternal age the odds of being in a globally delayed group increases by the factor of 2.462. For birth weight, for one unit change the odds of being in a globally delayed group decreases by the factor of 0.361. As most variables entered the model were not statistically significantly contributing to prediction of global developmental delay the same holds true for the application of physical punishment. For one unit change in the application of physical punishment the odds of being in a globally delayed group decreases by the factor of 0.952. On the other hand the independent variable the availability of playing materials was found to be statistically significant at 0.05 alpha level with the odds ratio of 2.758. The 95% confidence interval for this odds ratio is from 1.070 to 7.106. This means for one unit change in this independent variable the odds of being in a globally delayed group increases by the factor of 2.758. The odds ratio for family income level is 0.864. This shows for one unit change in family income level the odds of being in a globally delayed group decreases by the factor of 0.864. As it was shown in the table for exposure to illness for one unit change the odds of being in a globally delayed group increases by the factor of 2.227. The independent variable history of parental hearing impairment seems to have no contribution in prediction to global developmental delay. Finally, for one unit change in family size the odds of being in a globally delayed group decreases by the factor of 0.271 which is statistically significant at 0.05 alpha level with 95% confidence interval of 0.084 to 0.874. However, except for two independent variables as shown all others are not statistically significant in contributing to the predication of global developmental delay for this age group.

As it was done for the age intervals above MANOVA was carried out for this age group too and the results are shown in the following table.

Table 26

Results of MANOVA for 36 Months Age Group

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Playing Materials	Fine Motor Skills	2934.771	2	1467.386	4.409	0.023

In the above table it is shown that only one variable was found to be significant for this group and the variable was the availability of playing materials. The mean score for the group that had adequate access to the playing materials was 45.28 and the mean score for the group which did not have access to playing materials was 26.25 on the tasks of fine motor domain. For the group with partial access to playing materials the mean score was 40.54. As depicted in the above table the mean scores do significantly differ and thus availability of playing materials significantly contributed on the scores of fine motor skills. Preliminary evaluation of the data also showed that parental history of hearing impairment had significant contribution on the scores of some of the developmental domains for this age group. This variable was seen to be significantly contributing for the scores of communication, gross motor and problem solving domains. To see the mean difference between the groups independent samples t test was carried out. In this connection the mean of communication scores for children who had parents with history of no

hearing impairment was 51.622 with the standard deviation 10.371 and the mean for their counterparts was 36.667 with the standard deviation 15.275. The obtained t-value for the mean difference was 2.454 which is significant at 0.05 alpha level. In the same way the mean of gross motor scores for children who had parents with no hearing impairment was 52.095 with the standard deviation 12.724 and for their counterparts the mean was 31.667 with the standard deviation 27.538. The t-value obtained for the mean difference was 2.687 which is significant at 0.01 alpha level. Similarly, the mean of problems solving scores for children who had parents with no history of hearing impairment was 47.466 with the standard deviation 12.771 and the mean for their counterparts was 20.000 with the standard deviation 5.000. The t-value obtained for the mean difference was 3.708 which is significant at 0.001 alpha level.

Although not most variables were significantly contributing to the outcome scores to see the coefficients of determination the researcher presented the values. For communication scores R^2 obtained was 0.074 (adjusted 0.067), for gross motor scores the value was 0.203 (adjusted 0.082) and for fine motor scores the value was 0.270(adjusted 0.159). In the same manner for problem solving scores the value was 0.129 (adjusted 0.003) and for personal social scores it was 0.155 (adjusted 0.027).

4.2.7 Young Children in 48 Months Age Interval

Table 27

Maternal, Child and Home Related Risk Factors of Young Children in 48 Months Age Interval

Maternal, Child and Home Characteristics	Categories	Frequency	Percentage
Maternal Education	Do not read and write	40	29.2
	Elementary education	52	38
	High school and preparatory education	35	25.5
	College diploma or degree	10	7.3
Maternal Age	Between 20 to 34 years of age	119	87.5
	19 years and below and 35 years and above	17	12.5
Child's Birth Weight	2.5 kilo grams and above	111	81
	2.1 to 2.4 kilo grams	22	16.1
	1 to 2 kilo grams	4	2.9
Physical Punishment	Do not use physical punishment	54	40
	Use physical punishment	81	60
Availability of Playing Materials	Adequately available	15	10.9
	Partly available	43	31.4
	Not available	79	57.7
Income Level	1000 birr or less monthly	106	77.4
	1001 to 2000 birr	18	13.1
	2001 to 3000 birr	8	5.8
	3001 birr per month and above	5	3.6
Sex of Infants	Male	80	50.6
	Female	78	49.4
Illness of Children	Experienced illness	49	31
	Did not experience illness	109	69
History of Congenital Hearing Impairment in Parent/s	Parents not experienced the problem	152	96.2
	Parents who experienced it	6	3.8
Family Size	3 or less family members	33	24.3
	4 or more family members	103	75.7

It is depicted in the above table that large number of mothers of children in this age group had elementary level education (38%), which was followed by mothers who do not read and write (29.2%). Mothers who had high school or preparatory level education accounted 25.5% and those with college diploma, degree or above comprised only 7.3%.

Concerning maternal age, the above table depicts that the majority (87.5%) of mothers of children of this age category was in the age group between 20 to 34 years of age and the remaining (12.5%) were aged 19 or less or 35 years or more at the time of an assessed child birth. As far as child's birth weight is concerned the above table shows that about 81% of young children participated in this study weighed 2.5 kilo grams and above whereas only 2.9% of the children weighed 1 to 2 kilo grams at the time of birth. Those who weighed 2.1 to 2.4 kilo grams accounted for 16.1%.

The above table also shows the number and proportion of parents or care givers who did use physical punishment while raising their children and who did not tend to use physical punishment while raising their children. From the table it is possible to see that more number of parents or care givers seen to apply (60%) physical punishment compared to those who did not tend to apply (40%) physical punishment in disciplining their children.

Young children who have full access to necessary playing materials were very limited as depicted by the above table. They comprised only 10.9%. Those children with partial access to playing materials accounted for 31.4% and the majority of children in this age category did not have access to essential playing materials that comprised 57.7%.

The vast majority of parents of children in this age group earned 1000 birr or less monthly that accounted for 77.4% and those who earned 3001 birr or above were very limited comprising

only 3.6%. The parents who earned between 1001 birr and 3000 birr accounted 18.9%. As far as sex distribution is concerned one may see from the above table that approximately the same number of male and female children was involved in the study from this age group. Male children accounted 50.6% while female children accounted 49.4%.

The above table also depicts that more (69%) children did not experience illness for some months prior to the survey and considerable number (31%) of children experienced illness prior to the time of the survey. Regarding parental congenital hearing impairment it is possible to see from the above table that most (96.2%) of the parent/s did not experience congenital hearing impairment where as only 3.8% of the children's parent/s had experienced congenital hearing impairment. Most of the children in this age interval resided in households with members of 4 or more that accounted for 75.7%. Only 33 (24.3%) lived in homes with 3 or less members.

4.2.7.1 The Association of the Risk Factors with Global Developmental Delay of Young Children in 48 Months Age Category

As it was computed for all the age intervals shown above, logistic regression analysis was carried out for this age group too and the results are shown in the following table.

Table 28

Results of Logistic Regression Analysis for 48 Months Age Interval

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	0.517	0.761	0.461	1	0.497	1.676
Maternal Education	0.690	0.574	1.442	1	0.230	1.993
Maternal Age	1.995	0.894	4.983	1	0.026	7.356
Birth Weight	-0.068	0.733	0.009	1	0.926	0.934
Physical Punishment	1.045	0.858	0.279	1	0.223	2.844
Playing Materials	-0.349	0.661	0.000	1	0.598	0.705
Family Income	18.347	4.206E3	0.257	1	0.997	9.286E7
Exposure to Illness	0.033	0.779	0.002	1	0.967	1.033
History of Hearing Impairment	-0.227	1.432	0.025	1	0.874	0.797
Family Size	-1.424	0.755	3.554	1	0.059	0.241
Constant	-58.430	1.262E4	0.000	1	0.996	0.000

It is possible to see from the above table that most of the independent variables were not statistically significantly contributing to the prediction of global developmental delay. Nevertheless, to see the odds ratio of each of the independent variables sex of infants had the odds ratio of 1.676. This means being of female sex increases the odds of being in a globally delayed group by a factor of 1.676. Even if this is the case as this odds ratio is not statistically

significant, it is not different from what we would observe merely by chance. Concerning maternal education, for one unit change in maternal education, the odds of being in a globally delayed group increases by the factor of 1.993. Similarly, for one unit change in maternal age the odds of being in a globally delayed group increases by the factor of 7.356 which is statistically significant at 0.05 alpha level with 95% confidence interval of 1.276 to 42.413. For birth weight, for one unit change the odds of being in a globally delayed group decreases by the factor of 0.934. As most variables entered the model were not statistically significantly contributing to prediction of global developmental delay the same holds true for the application of physical punishment. For one unit change in the application of physical punishment the odds of being in a globally delayed group increases by the factor of 2.844. On the other hand the independent variable the availability of playing materials was found to have the odds ratio of 0.705. This means for one unit change in this independent variable the odds of being in a globally delayed group decreases by the factor of 0.705. The level of family income does not seem to contribute anything in the prediction of global developmental delay as one may see what is shown for this variable in the above table. As it was shown in the table for exposure to illness for one unit change the odds of being in a globally delayed group increases by the factor of 1.033. The independent variable history of parental hearing impairment had the odds ratio 0.797 meaning for one unit change in this variable the odds of being in a globally delayed group decreases by the factor of 0.797. Finally, for one unit change in family size the odds of being in a globally delayed group decreases by the factor of 0.241. However, except for one independent variable as shown all others are not statistically significant in contributing for the predication of global developmental delay for this age group.

As it was done for the age intervals above MANOVA was carried out for this age group too and the results are shown in the following table.

Table 29

Results of MANOVA for 48 Months Age Interval

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Birth Weight	Communication Skills	273.649	2	136.824	3.261	0.037
Physical Punishment	Gross Motor Skills	1045.077	1	1045.077	5.400	0.021
Availability of Playing Materials	Fine Motor Skills	1570.726	2	785.363	3.167	0.046

As one may see from the above table two independent variables were found to be significant for this group and they were birth weight and physical punishment. Birth weight was found to be significant for communication domain while physical punishment was significant for gross motor domain. Post hoc test was conducted to see how birth weight related to the scores in communication domain. Though there was somehow mean score difference among the groups in their means the post hoc test showed that the differences were not significant. In this line the mean of children who weighed 1 to 2 kilo grams at birth was 52.500, for those who weighed 2.1

to 2.4 kilo grams the mean was 53.000 and for those who weighed 2.5 kilo grams and above the mean was 57.677. To see how the means differ from one another in relation to parents who did apply physical punishment comparison was made between the groups. In this regard the mean of gross motor scores for children whose parents did apply physical punishment was 48.395 with the standard deviation 15.549 and the mean score of children whose parents did not apply physical punishment was 53.426 with the standard deviation 13.169. The obtained t-value for the mean difference was 2.021 which is significant at 0.05 alpha level.

As it is the case for most age intervals shown above, most of the independent variables did not as such significantly contribute to the scores of the dependent variables. Yet it is advisable to look into the amount of contribution they make. In this regard R^2 obtained for communication scores was 0.168 (adjusted 0.052), for the gross motor scores the value obtained was 0.174 (adjusted 0.058) and for fine motor scores it was 0.159 (adjusted 0.041). Similarly, for the problem solving scores the value was 0.101 (adjusted 0.025) and finally for personal social scores the value was 0.160 (adjusted 0.042).

4.3 Intervention with Developmentally Delayed Children

In the introductory part of this study it was described that intervening with developmentally delayed children was one of the aims of this research. In this connection as mentioned in the methods section from the sites where developmental screening was conducted two sites were selected randomly. Again randomly one of the sites chosen to be experimental setting and the other was assigned to be a comparison site. Before conducting intervention baseline data were collected on children's performance on developmental tasks. To assess whether the two groups were significantly different on their scores on dependent variables descriptive statistics,

independent samples t-test and MANOVA were carried out and the results are shown in the following table.

Table 30

Means and Standard Deviations for Treatment and Comparison Group Prior to Intervention

Developmental Domains	Groups	Mean	Standard Deviation	Standard Error of Mean
Communication	Experimental*	44.31	16.94	3.15
	Control**	48.68	13.63	3.13
Gross motor	Experimental	44.31	14.12	2.62
	Control	48.16	17.65	4.05
Fine Motor	Experimental	21.21	20.12	3.74
	Control	31.32	18.02	4.13
Problem solving	Experimental	27.41	18.50	3.43
	Control	40.53	16.32	3.74
Personal social	Experimental	32.07	18.54	3.44
	Control	42.63	17.11	3.92
Overall score	Experimental	169.31	74.04	13.75
	Control	211.32	71.86	16.49

NB: * N for experimental group 29 and ** N for control group 19

In the above table the mean scores for the five developmental domains and for the overall score were presented. It is possible to see from the table that the mean scores of comparison

group were greater than that of the intervention group in all of the domains. To see whether these differences are statistically significant or not independent samples t-test was carried out. The results of the test are shown in the following table.

Table 31

t-test for Pre-intervention Comparison of Means for the Two Groups

Developmental Domains	t-value	df	Sig.
Communication	-0.942	46	0.351
Gross Motor	-0.836	46	0.408
Fine Motor	-1.773	46	0.083
Problem Solving	-2.513	46	0.016
Personal Social	-1.989	46	0.053
Overall	-1.944	46	0.058

From the above table one may see that except for one developmental domain the mean difference between the groups was not significant. The mean difference for problem solving domain was significant with the t-value of -2.513 with df, 46 ($p<0.05$).

Table 32

Multivariate Analysis of Variance for the Two Groups Prior to Intervention

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Groups	Communication	219.605	1	219.605	0.888	0.351
	Gross motor	169.933	1	169.933	0.698	0.408
	Fine motor	1173.053	1	1173.053	3.142	0.083
	Problem solving	1973.708	1	1973.708	6.316	0.016
	Personal social	1280.717	1	1280.717	3.955	0.053
Error	Communication	11378.312	46	247.355		
	Gross motor	11196.733	46	243.407		
	Fine motor	17174.864	46	373.367		
	Problem solving	14375.771	46	312.517		
	Personal social	14894.283	46	323.789		
Total	Communication	113350.000	48			
	Gross motor	112200.000	48			
	Fine motor	48850.000	48			
	Problem solving	67375.000	48			
	Personal social	79250.000	48			

It is shown in the above table that the groups are significantly different on problem solving scores and they are not significantly different on the scores of all other domains as shown in the table. The procedure of MANOVA yielded the same result as what has been shown above using the independent samples t-test. In both procedures the groups significantly differed on problem solving scores and on other scores they are not significantly different.

Table 33

Means and Standard Deviations for Treatment and Comparison Group after Intervention

Developmental Domains	Groups	Mean	Standard Deviation	Standard Error of Mean
Communication	Experimental*	42.78	19.98	3.79
	Control**	52.22	14.27	3.36
Gross motor	Experimental	49.44	12.04	2.32
	Control	54.44	14.84	3.50
Fine Motor	Experimental	24.26	19.45	3.74
	Control	36.11	17.11	3.03
Problem solving	Experimental	31.11	16.78	3.23
	Control	45.28	14.50	3.42
Personal social	Experimental	32.96	18.98	3.65
	Control	47.22	13.53	3.19
Overall score	Experimental	180.37	72.15	13.89
	Control	234.17	61.03	14.38

NB: * N for experimental group 27 and ** N for control group 18

One can see from the above table that the means for comparison group were greater than the means for treatment group for all developmental domains after intervention. In this connection

the mean for communication scores was 42.78 for treatment group while it was 52.22 for comparison group. The mean for gross motor scores was 49.44 for treatment group where as it was 54.44 for comparison group. In the same way the mean for fine motor scores was 24.26 for treatment group while it was 36.11 for comparison group. For problem solving scores the mean was 31.11 for treatment group where as it was 45.28 for comparison group. Finally, for personal social scores the mean was 32.96 for treatment group while it was 47.22 for comparison group.

Table 34

t-test for Post Intervention Comparison of Means for Treatment and Comparison Groups

Developmental Domains	t-value	df	Sig.
Communication	-1.750	43	0.087
Gross Motor	-1.192	43	0.242
Fine Motor	-2.154	43	0.037
Problem Solving	-3.013	43	0.004
Personal Social	-2.751	43	0.009
Overall	-2.691	43	0.010

To see whether the mean scores for the two groups shown are significantly different independent samples t-test was carried out. It is shown in the above table that significant mean differences were observed in fine motor, problem solving, personal social and overall scores. The t-values shown above for these variables were significant either at 0.05 or 0.01 alpha levels. To

more ascertain this finding MANOVA was conducted for the two groups after intervention and the results are shown in table below.

Table 35

Multivariate Analysis of Variance for the Two Groups after Intervention

Source	Dependent Variable	Sum of Squares	df	Mean Squares	F	Sig.
Groups	Communication	963.333	1	963.333	3.062	0.087
	Gross motor	270.000	1	270.000	1.546	0.221
	Fine motor	1517.037	1	1517.037	4.404	0.042
	Problem solving	2167.500	1	2167.500	8.558	0.005
	Personal social	2195.926	1	2195.926	7.570	0.009
Error	Communication	13527.778	43	314.599		
	Gross motor	7511.111	43	174.677		
	Fine motor	14812.963	43	344.488		
	Problem solving	10890.278	43	253.262		
	Personal social	12474.074	43	290.095		
Total	Communication	112025.000	45			
	Gross motor	126875.000	45			
	Fine motor	54175.000	45			
	Problem solving	73925.000	45			
	Personal social	81950.000	45			

It is depicted in the above table that the groups were significantly different in the scores of fine motor, problem solving and personal social skills. The F-value for fine motor skills was 4.404 (with 1 and 43 degrees of freedom) which is significant at 0.05 alpha level where as the F-values for problem solving and personal social skills were 8.558 and 7.570 (with 1 and 43 degrees of freedom) respectively which are significant at 0.01 alpha level.

Table 36

Paired Samples t-test before and after Treatment for the Treatment Group

Developmental Domains	t-value	df	Sig.
Communication	0.370	26	0.714
Gross Motor	-1.631	26	0.115
Fine Motor	-0.743	26	0.464
Problem Solving	-1.432	26	0.164
Personal Social	-0.093	26	0.927
Overall	-0.862	26	0.397

The above table shows the comparison of mean scores for the treatment group before and after intervention. It is possible to see from the table that the t-values for the mean differences were not significant for all of the developmental domains.

Table 37

Paired Samples t-test before and after Treatment for the Comparison Group

Developmental Domains	t-value	df	Sig.
Communication	-1.636	17	0.120
Gross Motor	-2.755	17	0.014
Fine Motor	-1.230	17	0.235
Problem Solving	-1.310	17	0.207
Personal Social	-1.219	17	0.240
Overall	-2.169	17	0.045

In the above table mean scores on developmental domains for comparison group were compared before and after treatment. The t-values for the overall scores and gross motor domain were significant where as the t-values for the other domains were not significant.

In relation to intervention, in the foregoing presentation it was shown that the intervention and the comparison groups were compared on children's developmental outcomes on developmental domains and on their overall development. Besides, to see whether using the MISC model with the intervention group raised the parents sensitivity prior to and after intervention data were collected on both groups and the results are shown in the following table.

Table 38

Data on MISC Dimensions Prior to Intervention and After Intervention with Intervention and Comparison Groups

Groups	Prior to Intervention										After Intervention									
	MF		MM		MT		MFC		MBR		MF		MM		MT		MFC		MBR	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Comp	9	47	11	58	10	53	12	63	7	37	10	56	11	61	12	67	12	67	8	44
Inter	8	28	9	31	6	21	10	34	10	34	11	41	12	44	9	33	14	52	13	48

NB: Comp is for Comparison Group and Inter is for Intervention Group. Besides, MF is for Mediation of Focus; MM is for Mediation of Meaning; MT is for Mediation of Transcendence; MFC is for Mediation of Feeling of Competence; and MBR is for Mediation of Behavior Regulation and Planning.

As it is depicted in the above table, we see some changes in both groups before and after intervention in relation to the dimensions of the MISC model. For instance, before intervention 9 (47%) mothers in comparison group were seen mediating focus while this number is increased to 10 (56%) after intervention. Similarly, 8 (28%) mothers were seen mediating focus in intervention group which was increased to 11 (41%) after intervention. If one carefully looks at the table the change in frequency or proportion is small with the comparison group whereas the change is relatively larger with intervention group.

Chapter Five

Discussion

This research is initiated having three purposes in mind. The first purpose is screening infants and young children in the city in order to identify infants and young children that show delayed development in communication, gross and fine motor skills, problem solving and personal social skills. In due course infants and young children that showed delayed development in two or more of these areas are intended to be identified. The second purpose of this investigation is identifying risk factors associated with global developmental delay and the third purpose is conducting intervention with some developmentally delayed infants and children. Through the procedures outlined in the methods section samples of infants and young children are selected and their mothers or primary care givers are contacted through health extension workers and filled Amharic ASQ. Besides, these respondents completed questionnaire that assesses conditions within the home environment and those that related with the child in focus that assumed to expose the child to experience delay in development. Except some respondents who did not well complete the questionnaire most respondents completed the questionnaire well as it is shown in the results section. In the results section the raw picture of the data collected is presented and in this section what is presented in the results section is discussed in light of other investigations made and reviewed. Moreover, interpretations and implications of the findings are treated in this section too.

5.1 Screening for Developmental Delays

As it was presented in the results section, screening for developmental delays is carried out with infants and young children in different age intervals. In this line the screening is done with infants at 9, 12, 18 and 24 months of age and with young children at 30, 36 and 48 months age intervals. Theses age intervals are considered depending on what has been done in other parts of the world. For instance the American Academy of Pediatrics authorizes administering developmental screening tests in 9^{th}, 18^{th} and 30^{th} month home visits (Council on Children with Disabilities, 2006). Also in parts of United States developmental screening has been carried out at 6, 12, 18, 24 months 3, 4 and 5 years of age (Earls & Hay, 2006). In some European countries developmental screening carried out monthly in the first year of life or three or four times a year in the first year of life and in subsequent years in some cases twice in the second year of life otherwise once and in the remaining years once a year until children start schooling (Drillien & Drummond, 1983). Though the age ranges selected by the researcher do not perfectly fit the suggestions made by different authors attempt has been made to consider important age ranges indicated in the literature. The researcher believes that those important age ranges were all encompassed in this research.

In this screening process the researcher comes up with developmentally delayed children in developmental domains of communication, gross and fine motor skills, problem solving and personal social skills. Some children are seen to have developmental delays in two or more areas of development. As it is depicted in the results section, the large number of delays is observed in fine motor domain. In this regard 26.83%, 44.37%, 37.66%, 38.96%, 26.97%, 28.29%, and 10.76% of infants and young children from 9, 12, 18, 24, 30, 36, and 48 months age

intervals respectively showed delay in fine motor development. For most age intervals, the prevalence rate of delayed development in fine motor is by far very higher compared to what has been observed in other studies. For instance as it was shown in the literature section of this study the research conducted in Colombia revealed that 10.3% of the children showed delayed development in fine motor skills. May be it is possible to say that fine motor delay in 48 months age interval is somehow closer to what has been seen in Colombia (van Meerbeke, Talero-Gutierrez, & Gonzalez-Reyes, 2007). What is observed for most of the age groups can be comparable with the research conducted on adopted children from several countries. From these international adoptees 40% exhibited delayed development in fine motor domain (Miller, Kiernan, Mathers, & Klein-Gitelman, 1995). One possible reason why many infants and young children showed developmental lag in this domain may be parents or care givers do not allow children to touch or manipulate different objects in their environment for fear that the objects may harm their children. For instance in one case though the question in the questionnaire was not open ended but it asks whether the child puts on/off switches and the respondent answered by marking on the column of not yet and she indicated that she would not allow her child to do that. This is only one encounter and from this and from his personal experience this researcher puts forward the above reason as one possible explanation as to why most children showed delayed development in this domain. The other possible reason may be lack of playing materials in the home environment of most children where they can play and manipulate objects that would obviously hinder them from acquiring fine motor skills.

The reader may have noticed from what has been presented in the results section that considerable number of children exhibited delayed development in personal social domain too.

In this connection, 12.20%, 24.50%, 4.55%, 35.53%, 21.71%, 40.13%, and 8.86% of infants and young children from 9, 12, 18, 24, 30, 36 and 48 months age intervals respectively showed delayed development in personal social domain. When the researcher compares the proportions for these different age categories with the study conducted in Colombia the prevalence rate here is too high for most of the age groups. In Colombian study 9.8% of children involved in the study manifested delayed development in personal social domain. As one may see from the above proportions most of them are considerably greater than that of the Colombian proportion. On the other hand the proportions for children of 18 and 48 months were a bit lower for the current sample than that of the Colombian's (van Meerbeke, Talero-Gutierrez, & Gonzalez-Reyes, 2007). We may ask ourselves as to why large number of children showed delayed development in this domain. Most of the items incorporated in this domain ask about self help skills. As it is indicated above in fine motor domain, regarding this domain also it is possible to assume that parents or care givers do the tasks for the children. For instance parents or care givers may feed and dress the child even when the child is able to do these activities by her or himself. In instances of this kind it is no wonder if most infants and young children show delayed development in personal social domain.

The other area of development in which we have substantial number of infants and children showed delayed development is problem solving domain. In this domain 19.51%, 25.17%, 31.82%, 16.88%, 5.26%, 15.79%, and 13.92% of infants and young children from 9, 12, 18, 24, 30, 36 and 48 months age intervals respectively showed delayed development. As it is legitimate to think of this domain consistent with cognitive development, the research mentioned above (on international adoptees) reported that 16% of the adoptees were found to be delayed in their

cognitive development (Miller, Kiernan, Mathers, & Klein-Gitelman, 1995). With some exceptions, the findings for the age intervals indicated are comparable with the finding of Miller et al. However, for the age categories such as 9, 12, and 18 months the proportions are higher than that of the adoptees and for the age groups such as 30 and 48 months the proportions for the current samples are lower. For the remaining two age intervals it appears that the proportions are approximately comparable. As it is indicated above for some age groups the proportions are higher and the reader may ask why this is so? One possible reason may be the reason which is given to the fine motor domain above. To reiterate it, if the households are not adequately stimulating and equipped with adequate playing materials that hinder infants and children cognitive development, its one aspect being problem solving ability. Besides, whether parents or care givers guide their children in acquiring these skills or not would matter a lot. This is another possible reason for having such delayed development in this domain.

In the above paragraphs developmental delays in three of the domains are discussed. Compared to these three domains delays in gross motor and communication domains are lower in the samples of the current study. From infants and young children screened at 9, 12, 18, 24, 30, 36 and 48 months age intervals 17.89%, 14.57%, 14.94%, 17.53%, 12.42%, 13.16% and 10.76% respectively showed delayed development in the gross motor domain. However, when we compare these proportions with that of the Colombian still the proportions for most of the groups are higher though not very much higher as it is the case for the other domains. In Colombian study the prevalence rate reported was 9.3% for this domain (van Meerbeke, Talero-Gutierrez, & Gonzalez-Reyes, 2007). But when we compare this rate to ours especially for the first four age intervals what we have found here is still higher and for the remaining three age

intervals though higher than Colombian finding but closer to it. However, delay in this domain is comparatively lower when it is compared to what has been reported on international adoptees. The rate of gross motor delay for the adoptees group was 33% (Miller, Kiernan, Mathers, & Klein-Gitelman, 1995). From what has been reported above we see that delayed development in this domain is less prevalent. But it is still higher to others in certain instances. The possible reason for this may be the same as what is indicated in the fine motor delay case. That is if parents do not let their children move around, climb, run and so on and if infants and young children are confined to one area their development would be stifled. This may be the reason why we see delayed development to the extent showed here.

As far as delay in communication domain is concerned 14.63%, 5.3%, 5.84%, 6.49%, 7.19%, 7.24% and 3.16% of infants and young children from 9, 12, 18, 24, 30, 36 and 48 months age intervals respectively exhibited delayed development. From what we observed in Colombian group we see all the proportions of our infants and young children are lower than what has been reported for the Colombian preschoolers. For the Colombian group, delay in this domain was reported to be 18.6% (van Meerbeke, Talero-Gutierrez, & Gonzalez-Reyes, 2007). The finding of the present study was also lower when compared to the research that was conducted on international adoptees, which was 18% (Miller, Kiernan, Mathers, & Klein-Gitelman, 1995) that is similar to what has been found among Colombian preschoolers. From what we observe here, it seems that delay in communication domain is less prevalent among infants and young children of the study area. One may suspect that parents or care givers and members of the family may communicate to the child in adequate manner and may have encouraged both receptive and expressive language in their children, which may have

contributed to the lower number of delays in this domain. From the personal experience of the researcher, mothers in some cases may carry their children at their back and while the child is there they often talk to him or her and this may stimulate language development in children. May be this can be considered as a potential reason as to why we have observed low prevalence of delays in communication domain.

As it is indicated above, the rate of infants and young children who exhibited delay in two or more areas are identified in this study. Their number and proportions were shown in the results section. In this regard from 9, 12, 18, 24, 30, 36 and 48 months age intervals 24.39%, 37.75%, 35.71%, 39.61%, 18.30%, 28.95% and 10.13% respectively showed delayed development in two or more areas of development. When the researcher took the whole group and determined the rate of global developmental delay, it is found to be 28.13%. For most of the age intervals and for the whole participants the prevalence rate of global developmental delay is higher compared to other studies conducted in different parts of the world. This is the case as we compare the proportions here with what has been found in United Arab Emirates. In UAE the prevalence of global developmental delay was 8.4% (Eapen et al. 2006). In the same way most of the proportions in current study are higher than what has been observed in Colombian study, which has showed that 10.8% exhibited global developmental delay (van Meerbeke, Talero-Gutierrez, & Gonzalez-Reyes, 2007). Similarly, the proportion of global developmental delay is higher for most age intervals when we compare the proportions to the data obtained on international adoptees, which is 14% (Miller, Kiernan, Mathers, & Klein-Gitelman, 1995). In the same manner our data are higher than that which was reported for Korean children, which was 11.1% (Bang, 2008). The results obtained in this research may be comparable to what has been found

from foster care homes where the researchers determined that 34% of the children manifested delayed development in two or more areas of functioning (Lesile et al. 2002). Furthermore, for this group of children the prevalence of global developmental delay ranged between 13 and 62% (Lesile, Gordon, Ganger, & Gist, 2002). As one may see from the proportions showed, for most of the intervals, the case was in line with what has been discussed in this paragraph. But the proportion for 48 months age interval, which was 10.13%, was comparable to what has been reported by Drillien et al. (1988), which was 10% and comparable to the Colombian finding as well, which was 10.8%. Moreover, the proportion for this age interval is also comparable to what has been reported on adoptees from Ethiopia to Belgium. The proportion for this latter group was 12% (Meeus, Peeters, Ramet, Van Gompel & Wojciechowski, 2010) which is closer to 10.13%, which is the rate for the current sample of children in 48 months age interval. Also, it was closer to that of the Korean group which is showed above.

In the above paragraph it is indicated that infants and young children who exhibited global developmental delay are large in number compared to several research findings showed. This finding may be seen as a signal to watch out how parents/care givers raise their children. The proportion we have seen is very much similar to what have been observed in foster care homes. One may suggest different factors contributing to this. One possible reason can be that parents or care givers do not have adequate understanding about what they can do for their children so that their children can progress well by acquiring all developmental skills in age appropriate manner. As it was mentioned with respect to different developmental domains above parents may not create favorable play or exploratory environment for their children that may stifle development

in their children. In some cases parents may be out of home for much part of the day leaving the child with maid or in the neighborhood and with that comes inappropriate care and support that hamper acquiring developmental skills. These and other possible reasons can be cited as to why most infants and children showed global developmental delay. To substantiate these ideas, here under, some risk factors that are associated with global developmental delay are discussed.

5.2 Identification of Risk Factors Associated with Global Developmental Delay

During data collection several factors that are indicated in literature as risk factors for developmental delay are incorporated in the questionnaire and relevant data are collected on these factors from the study participants. The data on these factors are presented and analyzed in the results section of this research. As one may see from the results section several factors are assessed and these factors include maternal educational level, maternal age at the time of the child's birth, birth weight of the child involved, physical abuse and punishment, child's sex, the availability of playing materials and stimulating home environment, illness of the child, the history of congenital hearing impairment on parent or parents, family size and the level of household income. The association and contribution of these factors with global developmental delay and with developmental gains are analyzed through logistic regression analysis and MANOVA as showed in the results section. Let us see these for different age intervals.

5.2.1 Infants of 9 Months Age Interval

The first age interval was 9 months age interval. For this age segment as depicted in the results section a large number of mothers have high school and preparatory level education and also a substantial number of mothers are unable to read and write. Besides, a large number of mothers were at appropriate age when they gave birth to a child that was involved in this study.

Also, a large proportion of children have normal birth weight as showed in the fourth chapter. In addition to these, very few parents or care givers applied physical punishment and yet not many infants at this age enjoy adequate playing materials. Furthermore, a very large number of households earn low monthly income and about one third of infants in this age group experience illness prior to the survey. Concerning family size many households involved in this study for this age group inhabited by four or more members. All these variables are entered in logistic regression model as well as MANOVA. From these variables three of them are found significantly associated with global developmental delay as seen from logistic regression analysis. These three variables are maternal age, applying physical punishment, and unavailability of playing materials. This means mothers who were very younger or older at the time of child birth more likely gave birth to a child with global developmental delay. Of course this is consistent with several research findings. For instance Durkin (2002) reported that birth to aged mothers predispose children to manifest delayed development. In the same way a report by Hook (1981) indicated that as maternal age increases having a child with chromosomal abnormality also increases. Similarly, it was reported by researchers that children born to younger or teenage mothers showed developmental lag in cognitive and socio-emotional domains (Roosa, Fitzgerald & Carlson, 1982). As mentioned in this research also maternal age is seen to be significantly associated with developmental delay. The second risk factor which is found to be significant for this age group is applying physical punishment. As it is indicated in the literature section child maltreatment is a risk factor that predisposes children for developmental delay. The finding of this research is consistent to these findings such as the research by Pears and Fisher (2005) that showed maltreated children showed developmental

delay in various areas of development. In the same manner a research by Veltman and Browne (2001) revealed that there was clear association between developmental delay and child maltreatment. Similar finding was reported by Koenen, Moffitt, Caspi, Taylor and Purcell (2003). The third risk factor that is found to be significant for this age category is non-availability of playing materials. As it is shown through logistic regression analysis the unavailability of playing materials increases the odds of being in a globally delayed group in a significant way. This finding is consistent with the findings by Garrett, Ferron, Ng'Andu, Bryant, and Harbin (1994), which indicated that home environments that were not stimulating and where learning opportunities were not created predispose children for developmental delays. Similarly, a research by Bang (2008) showed that home environment that was not stimulating was found to be a risk factor predisposing children for developmental delay. Finding of the present research is consistent to these findings as the home environment devoid of adequate playing materials is obviously not stimulating for children and hence contributed to delayed development.

Except the variables indicated above, all the other variables were not found to be significant to predict global developmental delay for this age group. In this regard the finding is inconsistent with several studies that revealed significant association between global developmental delay and the risk factors indicated above. To mention some of these researches, for instance a research by Najman et al. (2004) showed that family income level was related to delayed development but in this research level of income was not significantly contributing in prediction of global developmental delay for this age interval. This may be due to the fact that households involved in this research do not greatly vary from one another in the level of income they earn. However, as one may see from the results section though some of the participants earned much but

their number was few and the income of the majority was very low. This implies among those who earned less most children may be progressing well in their developmental course and as such it is possible to suspect that other factors such as emotional environment at home may be working to buffer developmental delays in these types of households. In the same way variables such as birth weight, level of maternal education, history of developmental problems in parent or parents and illness of children are seen to be associated with developmental delays (Thompson et el., 2003; Agustines et el., 2000; Schendel et al., 1997; Siegel et al., 1982; Eapen et al., 2006; Durkin, 2002; Abubakar, Holding, Van de Vijver, Newton & Van Baar, 2010). However, for this age group these variables are not significantly contributing for predication of global developmental delay. Of course, as one may have noticed in the results section concerning birth weight most of the infants in this age group have normal birth weight and only very few of them have low birth weight and this may have prevented to see the difference between the groups as the variable appears not contributing to global developmental delay. Besides, it is important for the reader to be aware of the fact that being of low birth weight does not mean being automatically in a globally delayed group. Similarly, maternal education does not make any significant contribution and which may imply that there is no as such significant difference among the groups and being highly educated or having of low level of education does not make any difference. The same holds true regarding other variables too.

An attempt has been made in the above paragraphs to discuss the contribution of risk factors in predisposing a given infant to a global developmental delay as it was obtained from logistic regression analysis. As mentioned above, to see the contribution of these different

independent variables on scores of developmental domains the researcher carried out multivariate analyses of variance. This procedure yielded that independent variables such as maternal education, use or non-use of physical punishment, availability of playing materials and level of household income are seen important in contributing for the scores of different developmental domains. In this regard level of maternal education significantly contributed on the scores of gross motor domain. Surprisingly, as it is noted in the results section the performance of infants of illiterate mothers and mothers with high school and preparatory level education performed better than the other groups. Especially infants from mothers with college level education performed less. May be this is because these educated mothers do not allow their child to move around and to practice motor skills and they may over protect their infants. On the other hand illiterate mothers leave their child on the ground to move or to creep or crawl and that may have enabled them to score more in gross motor domain. Expecting that educated mothers would provide quality home environment that may facilitate gross motor development among children, the finding of this research is inconsistent with what was reported by Goyen and Lui (2002). In this study the authors indicated that quality home environment was positively associated with gross motor development. Concerning use or non-use of physical punishment, children of mothers who did use physical punishment scored significantly lower than children of mothers who did not use physical punishment as statistical tests revealed. This finding is tangentially related to what has been observed by most authors that the home environment is closely related to motor development and optimal development may be achieved in home environments that are favorable for children (Rodrigues, Saraiva, & Gabbard, 2005). As one may easily understand that abusive environment where parents use physical punishment cannot

be optimal and favorable for children and that may hamper their motor development and this may be why children from mothers who did use physical punishment scored less on the tasks of gross motor domain.

It is shown above that availability of playing materials is found to be significant for this age group. This variable significantly contributes on the scores of personal social domain. In the results section it is presented that children who have adequate access to playing materials performed better than the other groups on personal social domain. Considering that providing adequate playing materials is one aspect of quality care provision it is possible to say that the finding of this research is consistent with what Votruba-Dizal, Coley, and Chase-Lansdale (2004) reported in their work. These writers showed that quality of child care was associated with children's socio-emotional development. As far as family level of income is concerned this variable was seen to significantly contribute on gross motor scores. Among the groups, children from high earning group performed better compared to children from low earning group on tasks of gross motor domain. The researcher thinks that level of income is directly related to creating stimulating environment and as it was reported earlier (Rodrigues, Saraiva, & Gabbard, 2005) conducive home environment is essential in facilitating motor development in children. From this it seems that the finding of this research is consistent with the research indicated. In the same way a research by Garrett, Ferron, Ng'Andu, Bryant and Harbin (1994) showed that income level of parents as reflected in their socioeconomic status was seen to affect physical development of children by affecting the ability of parents to create stimulating home environment. This is possibly why children from high earning group performed better on gross motor tasks compared to children from households with low income.

In the foregoing discussion independent variables that were significantly contributing to developmental domain scores were indicated. In addition to what has been done, an attempt was made to see the contribution of all independent variables on these different developmental domains. In this connection coefficients of determination were worked out. This procedure yielded that 2.4% of the variance on communication scores accounted for by the independent variables showed above. Similarly, 9.6% of the variance on gross motor scores accounted for by the predictor variables entered the model. In the same way 4.3% of the variation on fine motor scores explained by the variables mentioned above. In the same manner, 4.1% of the variation on problem solving scores explained by the independent variables that are shown above. Finally, 2.3% of the variance on personal social scores was accounted for by the predictor variables assessed in this investigation. From what was presented here one would see that the predictor variables used to explain the variability on the scores of developmental domains only explain very limited portion of the variance and much of the variance remain unexplained by the predictor variables investigated in this research. The implication of this finding is that we need to consider other predictor variables in the future studies that may contribute immensely on the variability of developmental outcomes.

5.2.2 Infants of 12 Months Age Interval

So far discussion was made on risk factors that predispose children to global developmental delay and the contribution of these variables on scores of different developmental domains for infants of 9 months age interval. To proceed to the second age group which is 12 months age interval, the risk factors treated here were the same to that of the above age segment. For this age interval mothers who have elementary level education are by far with a large number followed

by mothers who have high school and preparatory level education. Regarding maternal age the great majority of mothers are in suitable child birth age and very small portion of the mothers are older or younger as it was showed in the results section. Approximately three-fourth of children of this age category is in the range of normal birth weight. Concerning use or non-use of physical punishment majority of the participants reported that they do not use physical punishment. Over half of the participants reported that their children do not have access to adequate playing materials and about three-fourth of the households income level is 1000 birr and less than that monthly. Concerning exposure to illness a considerable number of children of this age interval are exposed to illness prior to the survey. Parent or parents who experienced congenital hearing impairment are very few and negligible and most of the households have family size of 4 or more members. These risk factors including sex of children are evaluated by applying logistic regression analysis and MANOVA as it is done for the above age interval. These results are discussed here under.

From the risk factors entered the logistic regression model only one variable is found to be significant and all others are not significantly contributing to the prediction of global developmental delay. The variable which is significant was unavailability of playing materials. This is to mean the unavailability of playing materials significantly contributes for a child to be in a globally delayed group. It was shown for infants of 9 months age group that this risk factor contributed significantly for the prediction of global developmental delay and in the same way for infants of 12 months age category this risk factor is found to be significant in prediction of global developmental delay. This finding is consistent with the findings cited above for infants of 9 months age category in connection to playing materials. In addition to the studies mentioned

above this finding is also consistent with what was reported by Bradley et al. (1989). In their research Bradley et al. showed that specific dimensions of home environment such as playing materials were strongly associated with children's developmental status. Similar finding was obtained by Bradley and Caldwell (1976) where children's environment such as provision of playing materials seen to be associated with children's developmental outcomes. In the same way Bradley, Corwyn, Burchinal, McAdoo, and Coli (2001) examined the exposure of children to various conditions in the home environment such as parental actions and materials and found strong association between provision of stimulating environment and children's development in motor, social and vocabulary domains. Thus as mentioned above, in this research also availability or unavailability of playing materials was found to be strongly associated with the developmental outcomes of children and found to be a significant contributor in the prediction of global developmental delay.

With the exception of the risk factor shown in the above paragraph the other risk factors are not found to be significant in the prediction of global developmental delay in children of 12 months age interval. In this regard this finding is inconsistent with several research findings such as what was reported by McLoyd (1998). In this research McLoyd showed that socioeconomic disadvantage puts children at risk of developmental lag in cognitive and socio-emotional dimensions. As one might understand parental educational level and income level are the major components in measuring socioeconomic level of households. However, in this current research these two risk factors were not found to be significant for this age group. Some people may doubt the quality of education being offered in this country and though it is difficult to accept this comment as it is but there may be some truth in the comment as we see having

different level of educational accomplishment do not show variation in progressing well in the developmental course or not for children. Concerning the income level what has been indicated above for the infants of 9 months age interval may apply here as well. Regarding sex of children as depicted in the results section we see no significant contribution from this variable. This finding is consistent with what was reported by Dumaziar, Ozturk, Urai, Karaagaoglu, and Anlar (1998) where these researchers showed that variation between boys and girls on scores of developmental tasks was low and inconsistent. Similarly, risk factors such as low birth weight, maternal age, physical punishment, exposure to illness, history of parental developmental problems and family size were not significantly contributing for the predication of global developmental delay in children of this age category. This finding is inconsistent with the research findings by Thompson et el. (2003), Agustines et el. (2000), Schendel et al. (1997), Siegel et al. (1982), Eapen et al. (2006), Durkin (2002), and Abubakar, Holding, Van de Vijver, Newton and Van Baar (2010). All these studies showed that the risk factors mentioned were found to predispose children to experience delayed development but in this present study the risk factors are not found to be significant. The possible reasons that were mentioned for infants in the 9 months age interval also may apply as to why these risk factors do not contribute significantly for the prediction of global developmental delay for children in 12 months age interval too.

Even if most of the risk factors are not significant in predicting global developmental delay the contribution of these factors on the scores of the developmental domains is examined through MANOVA. This analysis yielded that maternal education, availability of playing materials, income level and exposure to illness are significantly contributing on the scores of

gross and fine motor, problem solving and personal social domains. To specifically indicate, maternal educational level is found to be significantly contributing on the scores of gross and fine motor domains; availability of playing materials contributed significantly to the scores of problem solving and personal social domains; level of family income is found to be significant for the scores of fine motor and problem solving domains; and exposure to illness is found to be important for the scores on fine motor domain.

As mentioned in the results section infants of mothers who have high school and preparatory level of education performed better in motor skills than infants who have mothers with other levels of education and those who are illiterate. This might be due to the condition that these mothers may be possibly not working outside and they may be house makers passing their time with their infants at home following and guiding their children's physical movements compared to those with higher educational level who may be possibly working outside home and may not get enough time to pass with their infants. On the other hand, compared to those with lower level of educational attainments and illiterate mothers this group of mothers might have better understanding concerning child care. This may be why infants of these mothers scored better than infants of other mothers on motor domain. This finding is consistent with the finding reported by Dumaziar, Ozturk, Urai, Karaagaoglu, and Anlar (1998) where maternal education and other social factors were closely associated with fine motor and communication scores. Besides level of maternal education which has significant contribution for gross and fine motor scores, availability of playing materials is found to significantly contribute for the scores of problem solving and personal social domains. The finding revealed that infants who have access to adequate playing materials are found to score better on the developmental domains

mentioned compared to those who do not have access to adequate playing materials. This finding is consistent with the finding obtained by Bee et al. (1982) in which case Bee et al. showed that general environmental quality of children's home was found to be significant for children's cognitive attainment. In the same way a research by Linver, Brooks-Gunn and Kohen (2002) indicated that creating intellectually stimulating environment was significantly associated with children's developmental outcomes. As making playing materials available and using the playing materials in children's plays is creating stimulating home environment which is found to be significantly associated with problem solving and personal social scores in this present study, which is consistent with the findings shown above.

As far as level of family income is concerned for infants of 12 months age interval, as indicated, it is significant on the scores of fine motor and problem solving domains. Infants from high earning group performed significantly higher than infants from other income groups on these domains. This finding is similar to what was obtained by Duncan, Brooks-Gunn and Klebanov (1994). In this work the authors have found that after controlling for factors such as maternal schooling and family structure, family income level was significantly associated with cognitive development and behavior of children. Similarly, as observed by Linver, Brooks-Gunn and Kohen (2002) creating cognitively stimulating environment contributes for cognitive development of children and to create such an environment parents need resources including financial resources and the researcher thinks that income level may be related with creating stimulating home environment that contributes to children's problem solving and fine motor development. That may be why infants from high earning group performed better on tasks of problem solving and fine motor domains in this study.

The other variable which is found to be significant after running MANOVA is exposure to illness. In this connection infants who were not exposed to illness scored far higher than infants who experienced illness on fine motor domain. This result is similar to what was reported by Walker et al. (2007) in which health problems encountered by children in developing countries challenged children's development. As can be observed from the results section and showed above, infants who encountered health problems scored less on fine motor domain. This finding is also consistent with what has been obtained by Stanton, McGee and Silva (1991) who showed that a measure of health problem was significantly associated with motor ability.

In the foregoing discussion for infants of 12 months age interval attempt is made to show the risk factors that have significantly contributed for the prediction of global developmental delay among infants in this category and independent variables that are significantly associated with the scores on certain developmental domains. Besides, the researcher tried to see the contribution of all the independent variables that entered the model on the dependent variables. In this line the proportion of variance accounted for by the independent variables on communication score is only 0.5%, which is negligible. Similarly, 3.2% of the variance on gross motor scores is accounted for by the independent variables that entered the model. For fine motor scores the proportion of variance accounted for by the independent variables is 16.8% that is a bit larger compared to others shown here. In the same way the variance accounted for by the predictor variables on problem solving scores is 10.2%. As far as personal social scores is concerned the proportion of variance accounted for by the independent variables is 11.9%. As it was indicated for infants of 9 months age category, for this age group also the great portion of variance remained unexplained using the predictor variables studied in this research. This

demands further investigation by incorporating other predictor variables that may better explain the variation on developmental outcomes of the infants of this age interval.

5.2.3 Infants of 18 Months Age Interval

The risk factors that are treated for the above age intervals also evaluated for infants of this age group. Concerning the level of maternal education more mothers of infants of this age interval have elementary level education followed by mothers who have high school and preparatory level education. Regarding maternal age the majority of mothers of infants of this age category are found to be in suitable age of giving birth. As to the birth weight large number of infants have normal birth weight and only very few of the infants are found to be of low birth weight. In relation to application of physical punishment about a quarter of the respondents indicated that they used physical punishment to discipline their children. Close to 50% infants of this age interval do not have access to playing materials and most households of these infants earned 1000 birr and less monthly. In connection to exposure to illness, a significant number of infants of this age category experienced illness as indicated in the results section. Most infants of this age group lived in households with a family size of 4 and more members. These risk factors including sex of children and parental history of developmental problems entered the logistic regression model and the result of this analysis was shown in the results section.

The logistic regression analysis yielded one risk factor as significantly contributing for the predication of global developmental delay for infants of this age category. The risk factor which is found to be significant is exposure to illness. As mentioned for the infants of the above age group obviously experiencing illness hinder the normal development of children. Supporting this point a research by Walker et al (2007) indicated that poverty coupled with health problems

detract a large number of children from reaching their developmental potential. In this current research also it is found that infants who have experienced illness are at a greater risk of having global developmental delay. The finding of this research is also consistent with what was reported by Abubakar, Holding, Van de Vijver, Newton, and Van Baar (2010) that showed among risk factors ill health was found to be a predictor for developmental delay among children who participated in the investigation in Kenya.

However, as most risk factors entered the model are not found to be significant for predicting global developmental delay among infants of this age group this finding is inconsistent to other several studies. For instance the research just mentioned in the above paragraph by Abubakar et al (2010) identified other factors such as low level of maternal schooling, birth underweight and stunting as significant predicators of developmental delay. Similarly, the research by Vohr et al. (2000) indicated low birth weight increased the risk of exhibiting delayed development in various areas of development. But in the present research variables such as maternal educational level and child's birth weight entered the model but are not found to be significant in the predication of global developmental delay among infants of this age group. Concerning low birth weight most infants involved in this study have normal birth weight and very few of the participants have very low birth weight and that may be prevented to see the variation as it was indicated for the above age groups. Schooling of mothers do not contribute significantly for this age group and the possible reason may be mothers at different level of education are not affected by the education they had or the education they had may not be relevant as to how they should raise their children. Yet further research is needed to assess these speculations.

Besides, other risk factors such as level of family income and maternal age are not found to be significant for infants of this age group which is inconsistent with the findings of Votruba-Dizai, Coley and Chase-Lansdale (2004) in which quality care and income were found to significantly contribute on the cognitive and socio-emotional development of children. However, as showed in the results section and as mentioned here level of family income does not seem to significantly contribute for the prediction of delayed development for infants of this age group. The possible reason may be similar to what has been indicated for the above age intervals. Regarding maternal age, inconsistent results were reported by different authors. As was indicated above, a research by Hook (1981) showed that the rate of having a child with chromosomal abnormality increases with increase in maternal age and it was also observed that children who are born to teenage mothers have the risk for developmental challenges (Geronimus, Korenman, & Hillemeier, 1994). However, this later research by Geronimus et al. showed that children of the teen mothers did not perform worse than their cousins who were born to mothers who passed their teen years. In another research Rothenberg and Varga (1981) reported that children of teenage mothers performed better than children of older mothers on Denver Developmental Screening Test. These show the inconsistency of the research findings that examined the role of maternal age on child development. Likewise, the finding of the current research that yielded insignificant contribution of the variable maternal age is inconsistent with most researches that showed being born to older or very younger mothers predisposes children to experience delayed development. The implication of the finding is that exploration of other factors within the home environment or family background is needed to better understand how maternal age do not contribute to delayed development in this research. Possible reasons of this sort can be

mentioned for other variables such as availability of playing materials, application of physical punishment, sex of children, family size and parental history of congenital hearing impairment as to how and why they do not significantly contribute to global developmental delay of children in this age category. However, assertions made to the above age groups possibly remain true for this age group as well and we need to explore in further investigations as to why these variables do not significantly contribute to the prediction of global developmental delay for infants of this age interval.

As logistic regression analysis yielded exposure to illness as a significant predictor for this age group, MANOVA also yielded this variable as the only variable that significantly contributed for the scores on communication, gross motor and fine motor domains. It is indicated in the results section that infants who do not experience illness scored significantly better than infants who experienced illness in these domains. It is shown above that an investigation by Walker et al. (2007) showed that health problems challenge children's attainment of their developmental potential and conversely it appears that those children who are healthy grow and develop optimally. In this current study as observed children who have not experienced health problems scored far more than those who have experienced health problems on the tasks of developmental domains just mentioned above. Similarly, a research report by Vohr et al. (2000) clearly indicated that exposure to various illness was found to hamper the developmental outcomes of children in various areas of development. This implies as mentioned above that the children who have not encountered illness in a better position to perform better on developmental tasks. This is what the researcher has obtained in this research.

To determine the proportion of variance accounted for by the predictor variables, as done for the infants in the above age groups MANOVA yielded the results that are shown in the results section. Accordingly, 19.9% of the proportion of variance on communication scores is accounted for by the independent variables entered the model. In the same way, 8.7% of the variance on gross motor scores is accounted for by the predictor variables used in this study. Similarly, the proportion of variance accounted for by the independent variables on the scores of fine motor scores is 3.9%. The variance accounted for by the independent variables entered the model for problem solving scores is 6.4%. This value for personal social scores is 3.1%. Like what is showed for the other age groups above, the explained variance with the predictor variables used is very small for most of the dependent variables for this age group. As mentioned earlier in the future other risk factors could be incorporated to further examine which factors may more explain variance on developmental outcomes of infants in this age category.

5.2.4 Infants of 24 Months Age Interval

The risk factors that are assessed for this age interval are all the same as what has been done for the other age intervals as well. In the results section it was put that level of maternal education is very much closer for this age group. The variation especially among those who have elementary level education, high school and preparatory level education and those who are illiterate is very small. But mothers who have elementary level education are a bit larger compared to others and those with diploma and higher levels of education are very small. As it is true for infants of other age groups, a large proportion of mothers for infants of this age group are in suitable age of child birth and more than three fourth of infants have normal birth weight as shown in the results section. Regarding physical punishment, considerable number of

parents (41.2%) use physical punishment to handle disciplinary problems of their children. Concerning availability of playing materials, more than half of infants involved in this study do not have access to adequate playing materials. As far as family income is concerned a large number of families earned 1000 birr and less monthly and a significant number of children experienced illness as shown in the results section. Some parents have experienced congenital hearing impairment though their number was very few and most households have the family size of 4 or more members. These risk factors entered the logistic regression model and the results were indicated in the previous chapter.

It is shown in the results section that none of the independent variables entered the model is turned out to be significant in the prediction of global developmental delay for this age group. This finding is inconsistent with results obtained in many other studies. For instance, Bendersky and Lewis (1994) examined several family and biological risk factors such as family composition, social class and illness or medical problems children experienced and found that these risk factors were significant predictors of developmental outcomes in cognitive and motor domains. Similarly, a research by Duncan, Brooks-Gunn and Klebanov (1994) showed that family income and poverty status were found to be significantly important in children's cognitive and behavior development. In the same way low birth weight coupled with illness and male gender contributed significantly in developmental outcomes of children (Vohr et al. 2000). In the same manner variables such as birth weight, level of maternal education, history of developmental problems in parent or parents and illness of children were seen to be associated with developmental delays (Thompson et el., 2003; Agustines et el., 2000; Schendel et al., 1997; Siegel et al., 1982; Eapen et al., 2006; Durkin, 2002; Abubakar, Holding, Van de Vijver, Newton

& Van Baar, 2010). But as mentioned above, the risk factors that are investigated in this research are not found to be significant for the prediction of global developmental delay for this age group. The possible speculations that are indicated for the above age groups may also apply for this age group in relation to the independent variables that are not significant in prediction of global developmental delay.

However, the procedure of MANOVA yielded some independent variables as significant such as level of maternal education, birth weight, level of family income, exposure to illness and family size. These variables are found to be significantly contributing to the scores of communication, fine motor and problem solving domains. In this connection, maternal education is found to be important in communication and fine motor domains. Birth weight is found to significantly contribute on the scores of problem solving domain. Level of family income is significant in fine motor domain and the same is true with exposure to illness. Family size is significantly associated with the scores of communication domain. These findings are consistent with some studies such as a study by Dollaghan et al. (1999), which reported that level of maternal education was found to be significantly contributing for children's speech and language development. Similar findings were reported by Poresky and Henderson (1982) and Hoff (2003). As maternal educational level counted on socioeconomic status and this variable was found to be strongly contributing for children's language development. In this current study also level of maternal education is seen to significantly contribute on the scores of communication domain. However, the result does not seem as one may expect to see. This is to mean that we may expect infants of mothers who have with diploma or above educational level perform better on the tasks of communication domain. This is not the case as one may have seen from the results section of

this research. Infants who have mothers with high school and preparatory level education performed better on communication tasks than mothers with higher or lower level of education. The researcher thinks that the possible reason that is shown for infants of the other group regarding this variable, maternal educational level, may apply for infants of this age group too. To repeat what has been indicated above, mothers with this level of education may get time and may be at home with their infants and they stimulate and that may have facilitated acquisition of communication skills on these children. This may set them apart from mothers who are with higher level of education and possibly working outside home and who may not get adequate time to play and communicate with their children to the adequate level. Again mothers with high school or preparatory level of education acquired somehow better education compared with those who have lower level of education and those who are illiterate that may have helped them to handle well their children in the way that facilitated the children's development. As seen maternal educational level not only contributed significantly for communication scores but also for the scores of fine motor domain. We expect educated mothers to create home environments that would be stimulating and learning oriented. This kind of environment promotes motor development in children. The research by Dumaziar, Ozturk, Urai, Karaagaoglu, and Anlar (1998) showed that maternal education seems to contribute significantly to the development on fine motor domains. But what the researcher found in this present research is that infants who have mothers with elementary level education performed better than others on fine motor tasks. Therefore, the finding of this research is not similar to what has been reported by Dumaziar et al. May be some of these mothers work at home the tasks that require coordination of eye and hand

movements like crafts and their children may look and imitate their mothers that may have contributed to higher score obtained by the infants of these mothers.

The other variable that is found to be significant for this age category is birth weight and this variable significantly contributed to the scores of problem solving domain. As shown in the results section infants with normal birth weight are found to score better significantly on problem solving tasks compared to those with low birth weight. This finding is consistent with what is reported by Vohr et al. (2000) who indicated that neurodevelopmental and functional challenges increased with decreased birth weight. In other words, as reported by Vohr et al. a substantial number of underweight children were seen to score low on developmental measures. As such in this current study low birth weight children scored significantly lower than normal birth weight children on problem solving tasks. Similar result was reported by Jefferis, Power and Hertzman (2002) where increase in birth weight was strongly associated with increase on cognitive tasks scores. Consistent to these findings, the current research as shown above revealed similar result where birth weight of children is significantly associated with problem solving scores.

In the foregoing discussion the role of two independent variables is presented regarding their contribution on developmental gains of infants of the age interval under discussion. In addition to these variables income level of households is found to be significantly contributing on the scores of fine motor domain. As indicated in the results section infants from high earning group scored significantly better on fine motor domain compared to infants in other groups. This may be due to parents who have high earning can create the home environment which may be favorable and stimulating. As reported by Rodrigues, Saraiva and Gabbard (2005) creating such

kind of environment stimulates motor development in children. Thus in this present research also it is possible to think in this way that parents who earn much may have created favorable and stimulating environment and that may be why infants of high earning parents scored better in fine motor domain as mentioned above. Concerning the family size, infants from small size families scored better on communication domain and this finding is consistent with what was reported by early works of Elder and Bowerman (1963), and Dandes and Dow (1969). In these investigations the authors found that households with large family size affected the degree of interaction that parents had with their children and by doing so affected the developmental gains of children. Besides, in these studies it was also reported that children from large family size homes scored poorly on developmental measures. Like these researches in this current study children from families with small family size scored better on communication tasks as mentioned above.

The proportion of variances accounted for by the independent variables entered the model are 5.4%, 2.2%, 9.9%, 8.2% and 7.3% for scores of communication, gross motor, fine motor, problem solving and personal social domains respectively. As it is the case for the other age intervals the proportion of variances accounted for by the independent variables entered the model are very low and much of the variance left unexplained by the predicator variables examined in this investigation.

5.2.5 Young Children of 30 Months Age Interval

The risk factors that are examined for this age interval are the same to that of the other age intervals. Concerning level of maternal education mothers of the children with elementary level education are large in number and those who have diploma and above are small in number as

shown in the results section. Regarding maternal age, a large number of mothers are in appropriate child birth age and about 87% of children of this age group have normal birth weight as indicated in chapter four. As far as physical punishment is concerned about one-third of participant mothers indicated that they have used physical punishment to discipline their children. Half of young children involved in this research do not have access to adequate playing materials. A little above three-fourth of the households of these children earned 1000 birr and less monthly. In connection to exposure to illness, a bit more than one-third children in this age category experienced illness as shown in the results section. Parents who have congenital hearing impairment are negligible and a large number of children are from families with 4 or more members. As it is done for other age intervals these variables entered the logistic regression model and MANOVA is also carried out.

From the risk factors entered the logistic regression model only birth weight is found to be significant for the prediction of global developmental delay for children of this age interval. This is to mean that children with low birth weight are found to be more likely in globally delayed group as shown in the results section. This finding is consistent with several others that showed being of low birth weight predisposes children to have delayed development (Vohr et al., 2000; Jefferis, Power, & Hertzman, 2002; Thompson et al., 2003; Agustines et al., 2000; Schendel et al., 1997; Smedler, Faxelius, Bremme, & Lagerstorm, 1992; Dewey, Crawford, Craighton, & Sauve, 1999; Pietz et al., 2004; Siegel et al., 1982). All these researches showed the link between low birth weight and delay in development and underweight children were found to show delayed development in different aspects of development. It is found in this present research also that low birth weight is a significant predictor of global developmental delay for children

of this age interval. As showed, with the exception of this risk factor others are not found to be significant as the results from logistic regression analysis showed. As possible explanations are given for the other age intervals for most of the risk factors, the researcher thinks that those speculations may apply for this age group too. But the researcher believes that further investigations should be carried out to shade light on this issue.

Multivariate analysis of variance yielded three predictor variables as significant on the scores of dependent variables. These predictor variables are birth weight, use or non-use of physical punishment and exposure to illness. Birth weight has significantly contributed on gross motor and personal social scores, where as physical punishment is significant in problem solving scores and exposure to illness is found to significantly contribute on the scores of communication. As far as birth weight is concerned the result of this research is consistent with that of Jefferis, Power and Hertzman (2002) in which they reported that increase in birth weight was accompanied by increase on the scores of developmental outcomes. As discussed in the above paragraph several researches showed strong association between birth weight and children's performance on developmental tasks. As such the finding of this research is consistent with the findings of the researches showed above. Concerning use or non-use of physical punishment, this variable is found to contribute on the scores of problem solving domain. Considering physical punishment as child maltreatment, it is possible to say that this finding is consistent with the result of a research by Rieder and Cicchetti (1989) who indicated that maltreated and non-maltreated children performed differently on cognitive tasks. The same result was also reported by Rogosch, Cicchetti and Aber (1995). In this current research also physically punished and non-punished children performed significantly differently on the problem solving

tasks. As shown in the results section non-punished children performed by far better than their punished counterparts. In addition to the two variables discussed, exposure to illness is also found to significantly contribute on the scores of communication domain. This result is consistent with what is reported by Vohr et al. (2000) where children exposed to illness manifested differences in their neurodevelopmental attainments and in this current study as it is shown children who are not exposed to illness and those who are exposed performed differently on the communication tasks. Likewise, as put in several places above the research by Walker et al. (2007) exhibited that health problems challenge children from attaining their developmental potential. This is what we observe in this current investigation as well.

To determine proportion of variance accounted for by the independent variables entered the model coefficients of determination are obtained and in relation to this 0.2%, 5.0%, 1.7%, 9.4% and 11.7% of the variances on communication, gross motor, fine motor, problem solving and personal social scores are accounted for by the predictor variables entered the model respectively. In almost all cases as it is true for the other age intervals the variance explained by using the independent variables studied in this study is very small. As mentioned several times this may imply further investigation for the future.

5.2.6 Young Children of 36 Months Age Interval

Level of maternal education as one risk factor examined for this age interval as done for the other age intervals. As it is possible to see in chapter four a large number of mothers are with elementary level education and a least number of mothers are with diploma and above level of education. Regarding maternal age a large number of mothers are in suitable child birth age as depicted in the results section and about 82% of children involved in this study have normal birth

weight. About half of parents involved in this study apply physical punishment in their attempt to handle disciplinary problems of their children. As far as availability of playing materials is concerned, a little above half of children do not have access to adequate playing materials and about 63% of the households earned 1000 birr and less monthly. Concerning exposure to illness, considerable number (34.4%) of children experienced illness and some parents have history of congenital hearing impairment though their number is very few. As far as family size is concerned, a large number of children are from families with 4 or more members. These factors are evaluated thorough logistic regression analysis and MANOVA.

After running logistic regression analysis, the procedure yielded two risk factors as significantly contributing for the prediction of global developmental delay for children of this age group. These risk factors are unavailability of playing materials and family size. This implies that children who do not have access to adequate playing materials are in a greater risk of experiencing global developmental delay. This finding is similar to what has been reported by Bradley et al. (1989), which indicated that particular dimensions of home environment including parental sensitivity and presence or absence of stimulating playing materials were seen to strongly affect child's developmental status. In the same way a research by Votruba-Dizal, Coley, and Chase-Lansdale (2004) showed that creating quality home environment was associated with children's developmental outcomes. Providing adequate playing materials may boost the level of quality that children may enjoy and that seems strongly associated with developmental outcomes of children. In this present study it is found that this variable is strongly associated with the developmental outcomes of children and hence it became a significant predictor of global developmental delay for children in this age category. The second

variable that is significant for this age group is family size. This finding is similar to what Elder and Bowerman (1963) indicated in which case the authors showed that number of children at home influence the degree of parental involvement with their children and hence affect their children's development. In the same way a research by Dandes and Dow (1969) showed that children from large size families performed less on developmental tasks. In this current study also children from large size families are found to be at risk for global developmental delay. As said earlier only these two risk factors are found to be significant for this age group and the other factors are not found to be significant as the results from logistic regression analysis revealed. As far as other risk factors are concerned, the possible reasons that are indicated for infants and children of the other groups may also apply to children of this age group as to why the factors do not contribute significantly for the prediction of global developmental delay for this age group.

Besides, multivariate analysis of variance yielded again two independent variables significantly contributing on the scores of certain developmental domains. These variables are availability of playing materials and parental history of congenital hearing impairment. Availability of playing materials contributed significantly on the scores of fine motor domain while parental history of developmental problems is found to significantly contribute on the scores of communication, gross motor and problem solving domains. It is shown in the above paragraph that different researches indicated the importance of creating stimulating and quality home environment that highly contribute for variation in children's developmental status and not to repeat these studies the researcher would say that this finding is consistent with the research findings showed above. Concerning parental history of developmental problems, it appears that

this factor may affect the care giving capacity of parents or may contribute to biological vulnerability and that is why children of these parents performed less on communication, gross motor and problem solving domains. It seems that the mechanism how this factor contributed on the developmental outcomes needs to be assessed in the future.

The proportion of variance accounted for by the independent variables entered the model obtained through the statistical procedure and in this connection 6.7%, 8.2%, 15.9%, 0.3%, and 2.7% of variances are accounted for by the independent variables on communication, gross motor, fine motor, problem solving and personal social scores respectively. The variance explained is very low for most of the developmental domains as it is the case for the other age intervals. As it is suggested for the other age intervals, further investigation is required in the future to come up with the variables that could adequately explain the variation on developmental outcomes for this age interval.

5.2.7 Young Children of 48 Months Age Interval

All the risk factors examined for the above age intervals are examined for this last age interval in this study. As it is true for most of the age intervals mothers with elementary level of education comprised the majority for this age interval too and those with college diploma and higher level of education comprised the minority. Composition of maternal age is more or less similar to that of the other age intervals. This to say most of them are in appropriate child birth age and a little more than four-fifth of children of this age interval have normal birth weight as depicted in the results section. Sixty percent of the parents involved in the study use physical punishment to deal with the disciplinary problems of their children. As shown in the results section only 11% of children of this age group have full access to playing materials. About 77%

of the households earned 1000 birr and less monthly. Concerning exposure to illness, considerable number (31%) of children experienced illness prior to the survey. Most children are from the households with large family size. These risk factors as well as history of parental congenital hearing impairment and sex of children examined statistically.

The logistic regression analysis yielded one risk factor as significant for this age group. This risk factor is maternal age. The finding implies that mothers who are very younger or older at the time of child birth most likely gave birth to globally delayed child. This finding is consistent with the findings of Durkin (2002), Hook (1981), Roosa, Fitzgerald and Carlson (1982). These researches showed that mothers who were older or younger at the time of child birth most likely give birth to a child with developmental delay. Like other age groups, most risk factors are not significant for this age group as well and the possible explanations given to the infants and young children in the other age groups may apply as to why the risk factors are not significant for the prediction of global developmental delay for children in this age group as well.

On the other hand, multivariate analysis of variance yielded that two predictor variables are found to be significant. These variables are birth weight and use or non-use of physical punishment. Birth weight is found to significantly contribute on the scores of communication while use or non-use of physical punishment is found to contribute significantly on the scores of gross motor tasks. These results are consistent with the research findings shown above and specifically concerning birth weight it was shown that increase in birth weight was associated with increase on performance on developmental tasks. Similarly, it was put above that children with low birth weight showed poor development and in this research also those with normal birth weight performed better on communication tasks compared to their low birth weight

counterparts. In the same way children who are physically punished performed significantly less than their non-punished counterparts on gross motor tasks. This may be due to the condition that physically punished children may be afraid of attempting motor skills as doing that may annoy parents who may punish the child. Regarding physical punishment a meta analytic study carried out by Gershoff (2002) showed that this variable was associated with a number of child developmental outcomes including mental well-being. So children who are frequently punished by parents may be anxious of performing certain activities that could have promoted their motor development. In this current study it is found that physically punished children performed less on gross motor tasks as mentioned above. So as shown for children in the other age intervals treating children in abusive way hampers their development and this is what we observe in this research too.

As it is done for the other age intervals, the proportion of variances accounted for by the independent variables entered the model are determined for this age interval as well. In this regard 5.2% of the variation on communication scores is accounted for by the independent variables that are entered the model. In the same way 5.8% of the variance on gross motor scores is accounted for by the predictor variables and the value for fine motor scores is 4.1%. For problem solving scores the variance accounted for by the independent variables is 2.5% and it is 4.2% for personal social scores.

5.3 Intervention with Developmentally Delayed Children

The data are presented in the results section that intervention is carried out in two sites that are selected randomly. The sites are district 8 of Addis Ketema sub-city and district 11 of Kolfe Keranyo sub-city. Before the intervention was conducted data on developmental

domains are collected from these two sites. As it is shown in the results section except on scores of one domain (problem solving) the groups were not significantly different on scores of other developmental domains. However, the mean scores of the comparison group are greater than the mean scores of treatment group prior to intervention. After intervention is conducted the groups were again compared on the mean scores of developmental domains. During this time significant differences are observed on three of the five developmental domains that are assessed in this investigation. In this line, significant differences are observed on fine motor, problem solving and personal social domains. As it was a case prior to intervention comparison group performed better in all of the developmental domains evaluated in this research. Of course intervention was carried out for both of the groups. It was shown in the methods section that different intervention activities were listed for children of different age levels in ASQ manual and parents in comparison group have been given training on these different intervention activities where as parents in treatment group have been given training on these activities as they are integrated to intervention procedures indicated in MISC model. It is assumed that children in treatment group would score better after intervention on the tasks of developmental domains. However, this did not happen in this research. Hence, the result of this research is inconsistent with Klein and Alony (1993) who reported that children participated in MISC program performed better compared to their control counter parts on developmental tasks. May be the possible reason for this finding could be divergence of focus for the treatment group as they have been offered training both on intervention activities integrated to MISC procedures where as those in comparison group only received training on intervention activities. However, as one may have noted from the results section that the parents in the intervention group have

showed some changes in the dimensions of MISC prior to intervention and after intervention. For instance, before intervention parents who have seen mediating focus were only 28% in intervention group, which was increased to 41% after intervention. For comparison group this figure was 47% before intervention that was increased to 56% after intervention. From this one would possibly see that there is change for both groups prior to and after intervention yet the rate of change is slightly higher for intervention group compared to comparison group. Thus, intervention with MISC model brought change in the dimensions of parenting that are believed to be essential in promoting optimal development in children.

Chapter Six

Summary, Conclusion and Recommendation

6.1 Summary

This research was carried out to achieve three specific objectives. These three specific objectives were determining the prevalence rate of developmental delays of specific developmental domains and global delay among infants and young children in Addis Ababa; identifying risk factors associated with global developmental delay; and intervening with globally delayed children. To accomplish these objectives randomly selected 1062 infants and young children with their mothers or care givers were involved in the study and data were collected from these participants using Amharic ASQ. In addition to ASQ, questions pertaining to home, maternal and child characteristics were set and participants responded to these questions too. Adequately completed questionnaires were considered in data analysis and data were analyzed.

To analyze the data proper statistical procedures were used such as frequency distributions, percentages, t-tests, multivariate analysis of variance and logistic regression analysis. Through these procedures the prevalence rates of children with developmental delays in each developmental domain and in global functioning were determined. Besides, the risk factors that were associated with global developmental delay were identified. Moreover, the contributions of the predictor variables on the scores of outcome variables were determined. Furthermore, the differential gains achieved by infants and young children in intervention and comparison groups were evaluated.

Using the procedures indicated, screening for developmental delays was carried out with infants and young children of different age groups. By sticking to the definition that developmental delay is said to occur when a child's score on a developmental task situated at or below 2 standard deviation points from the mean; scores of some children from the age groups involved in the research were found to be at or below 2 standard deviation points from the mean. In this connection from infants in 9 months age group 14.63%, 17.89%, 26.83%, 19.51% and 12.20% exhibited delayed development in communication, gross motor, fine motor, problem solving and personal social domains respectively. Likewise, from infants in 12 months age category 5.30%, 14.57%, 44.37%, 25.17% and 24.50% showed delayed development in communication, gross motor, fine motor, problem solving and personal social domains respectively. Similarly, for infants in 18 months age group delayed development was manifested by 5.84% in communication, 14.94% in gross motor, 37.66% in fine motor, 31.82% in problem solving and 4.55% in personal social domains of development. In the same manner, from infants in 24 months age category 6.49%, 17.53%, 38.96%, 16.88% and 35.53% revealed delayed development in communication, gross motor, fine motor, problem solving and personal social domains respectively. In the same way for young children in 30 months age category delayed development was shown by 7.19% in communication, 12.42% in gross motor, 26.97% in fine motor, 5.26% in problem solving, and 21.71% in personal social domains of development. From young children in 36 months age group 7.24%, 13.16%, 28.29%, 15.79% and 40.13% manifested delayed development in communication, gross motor, fine motor, problem solving and personal social domains respectively. Finally, from young children in 48 months age category 3.16%, 10.76%, 10.76%, 13.92% and 8.86% exhibited delayed development in communication, gross

motor, fine motor, problem solving and personal social domains respectively. As far as global developmental delay was concerned 24.39%, 37.75%, 35.71%, 39.61%, 18.30%, 28.95% and 10.13% infants and young children from 9, 12, 18, 24, 30, 36 and 48 months age groups respectively exhibited globally delayed development. From the overall groups of children global developmental delay was manifested by 28.13%.

After determining specific delays and global developmental delay, risk factors associated with global developmental delay were evaluated through logistic regression analysis. Besides, the contributions of predictor variables on the outcome variables were assessed through MANOVA. These analyses were carried out for each of the age categories involved in the study. In relation to this for infants of 9 months age category risk factors such as maternal age, physical punishment and unavailability of playing materials were found to be significantly associated with global developmental delay. For this age group predictor variables such as level of maternal education, use or non-use of physical punishment, availability or unavailability of playing materials and level of family income were found to significantly contribute on the outcome scores of children in developmental domains such as gross motor, fine motor and personal social domains of development. Similarly, for infants of 12 months age group the risk factor unavailability of playing materials was significantly associated with global developmental delay and variables such as level of maternal education, availability or unavailability of playing materials, level of

family income, exposure or non-exposure of infants to illness were found to significantly contribute to scores of developmental outcomes in domains such as gross motor, fine motor, problem solving and personal social. Concerning infants of 18 months age category the risk

factor exposure to illness was found to be significantly associated with global developmental delay. For this age group the predictor variable exposure or non-exposure to illness was found to significantly contribute on developmental scores of communication, gross and fine motor skills. Regarding infants of 24 months age group no risk factor was significantly associated with global developmental delay and for this age group predictor variables such as level of maternal education, birth weight, level of family income, exposure or non-exposure to illness and family size were found to significantly contribute on scores of communication, fine motor and problem solving domains. As far as young children of 30 months age group was concerned low birth weight was significantly associated with global developmental delay and independent variables such as birth weight, use or non-use of physical punishment, and exposure or non-exposure to illness were seen to significantly contribute on the scores of gross motor, personal social, problem solving and communication domains. For young children of 36 months age group unavailability of playing materials and family size were significantly associated with global developmental delay and independent variables such as availability or unavailability of playing materials and parental history of developmental problems were significantly contributed to fine motor, gross motor, problem solving and communication scores of children. Finally, for the last age group – young children of 48 months age category - the risk factor maternal age was found to be significantly associated with global developmental delay. Besides, predictor variables such as birth weight and use or non-use of physical punishment were found to significantly contribute on the scores of communication and gross motor domains.

Intervention was carried out with 49 infants and young children inhabited in two districts of the two sub-cities that were indicated in other sections of this research report. But during the time of

post intervention data collection two participants from the treatment group and one participant from the comparison group left their residence and data on 46 participants were obtained and analyzed after intervention. Participants in comparison group performed better on all developmental tasks compared to participants in treatment group. Though improvements were seen on the scores of treatment group prior and after intervention the mean differences were not significant for all of the developmental domains for this group. On the other hand for the comparison group significant mean differences were observed for overall scores and gross motor scores.

6.2 Conclusion

Based on the findings of the research the following conclusions are drawn:

- From all infants and young children involved in the study 28.13% exhibited global developmental delay, i.e., delay in two or more areas of development.
- In almost all age categories more male infants and young children showed global developmental delay compared to their female counterparts.
- From all the domains of development more delayed development was seen in fine motor domain as 30.53% of infants and young children manifested delayed development in this domain. The second one was personal social domain in which 21.15% of infants and young children showed delayed development. The third place was taken by delayed development in problem solving domain where by 18.28% of infants and young children revealed delayed development in this domain of development. 14.35% and 6.89% of all infants and young children that took part in this study showed delayed development in gross motor and communication domains respectively.

- The risk factors such as maternal age, low birth weight, unavailability of playing materials, exposure to illness and family size were found to be significantly associated with global developmental delay of infants and young children of different age groups participated in this research. Besides, predictor variables such as level of maternal education, use or non-use of physical punishment, availability or unavailability of playing materials, level of family income, exposure or non-exposure to illness, birth weight, family size and parental history of congenital hearing impairment were found to significantly contribute on scores of specific developmental domains.
- The predictor variables entered the model did not explain much of the variance on the outcome scores and the highest one in this regard was 19.9% which was the explained variance for communication scores for infants of 18 months age group. All other coefficients of determination were lower than this and indicating that much of the variance left unexplained by the independent variables investigated in this study.
- The intervention carried out with globally delayed infants and young children showed that infants and young children in comparison group performed better than infants and young children in treatment group.

6.3 Recommendations

After having observed the findings of this study the researcher would like to put forward the following recommendations:

- As the research showed that some infants and young children did show delayed development in different areas of development, parents and health care providers are required to be aware of this fact and carryout the screening of developmental delays in

infants and young children and intervene with those children who exhibit delayed development.

- It is observed from the finding of this study that more delayed developments were in the areas of fine motor, personal social and problem solving domains of development. This may imply that children may not be allowed to practice the skills to promote development of these areas or that they may not be provided with proper and adequate opportunities to grasp skills in these areas. Thus parents are expected to allow their children or provide opportunities to practice skills in these areas of development. Also health extension workers in their visit to households are required to create awareness among parents the benefit creating opportunities and allowing children to practice fine motor, personal social and problem solving skills.
- Use or non-use of physical punishment and availability or unavailability of playing materials were found to significantly affect scores on developmental domains. Hence, parents should be aware of this fact and rather using corporal punishment to discipline their children they better use reasoning, explanation and discussion with their children and telling the negative consequences of the behaviors that may harm the children. Besides, providing adequate playing materials is essential to promote development of children. Thus, parents are expected to equip their children's environment with adequate playing materials and that can be done even from locally available materials.
- In some cases risk factors supposed to predict global developmental delay were not significant at all in the prediction of global developmental delay. This is the case with the

infants of 24 months age group. Therefore, with infants of this age group further study should be carried out to clear out how the risk factors were not associated significantly with globally delayed development for this age group. For that matter except limited risk factors most of the factors entered the models for the age groups took part in this study were not significant which pushes this researcher and other interested researcher to further conduct future studies to understand how these results were obtained. Similarly, as observed above, much of the variance on outcome variables were left unexplained by the predictor variables used in this research, hence, further studies should be conducted by including other variables and taking other samples of children.

- Focused intervention should be carried out with children that show global developmental delay as diverging attention to different sorts of training may not bring the desired outcome. Thus, health care workers such as health extension workers could apply focused intervention with delayed children that would bring significant improvement in developmental gains of these children.

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Appendices

Appendix A: Correlation Coefficients for Developmental Domains and Overall Scores in the Pilot Study

Appendix B: Number of Children that Showed Delayed Development in the Pilot Study

Appendix C: Proportion of Delays with Respect to Five Domains in the Main Study

Appendix D: Consent Request Form

Appendix E: Family Background Characteristics

Appendix F: Intervention Training Material from the MISC Model (in Amharic)

Appendix G: Intervention Training Material from ASQ Users Guide (in Amharic)

Appendix H: Observation Checklist

Appendix A: Correlation Coefficients for Developmental Domains and Overall Scores in the Pilot Study

Pearson r for Developmental Domains and Overall Scores in Pilot Study

Developmental Areas	Communication	Gross Motor	Fine Motor	Problem Solving	Personal Social
Communication					
Gross Motor	0.366**				
Fine Motor	0.206	0.324**			
Problem Solving	0.373**	0.404**	0.451**		
Personal Social	0.367**	0.351**	0.298*	0.483**	
Over all	0.637**	0.691**	0.683**	0.774**	0.711**

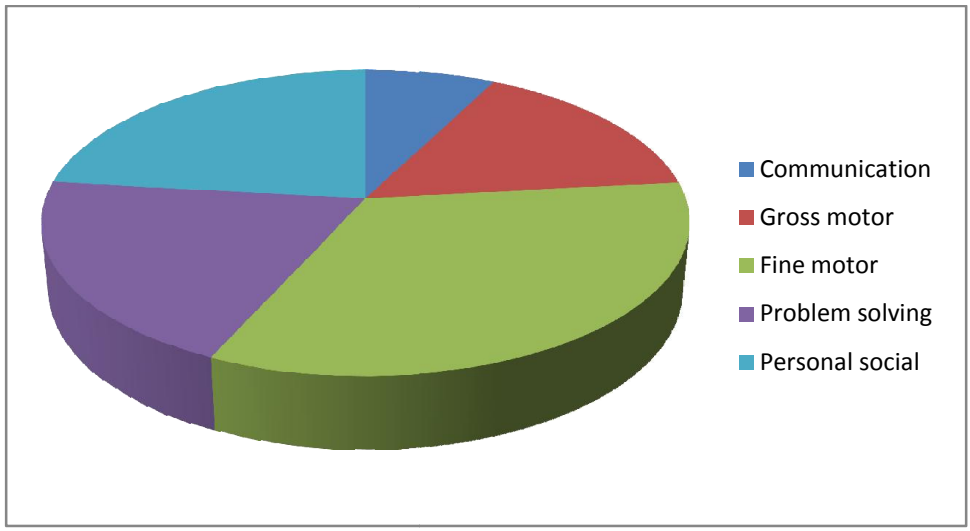
Note. ** Significant at 0.01 level, * Significant at 0.05 level

Appendix B: Number of Children that Showed Delayed Development in the Pilot Study

Number of Infants and Young Children whose Score is at or below the Cut off Points

Areas of Development	Age Categories						
	9 months N 10	12 months N 10	18 months N 10	24 months N 9	30 months N 10	36 months N 10	48 months N 10
Communication	-	2	-	1	1	1	-
Gross Motor	1	2	-	-	2	1	2
Fine Motor	3	4	4	5	3	-	1
Problem Solving	2	1	-	1	2	-	2
Personal Social	2	3	-	3	7	5	2
Delay in two or more areas	1	2	-	2	4	1	2

Appendix C: Proportion of Delays with Respect to Five Domains in the Main Study



Proportion of development delay with respect to five domains among infants and young children of Addis Ababa