

PART 2 Nurturing Human Capital

Chapter 4 Early Childhood Investments for the Development of Human Capital

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4.1 Introduction

Children start to learn long before they enter a classroom. Learning occurs from birth, as children interact with the mother, the family and other caregivers; the foundation for all later learning is established in the early years. The period of early childhood (birth to 5 years of age) is one during which crucial parts of the brain develop; and certain skills and attitudes acquired in the early years enable children to accumulate more effectively all types of skills, providing a strong base upon which to facilitate learning and development. This is because skill formation over the lifecycle is dynamic in nature: skills and motivation produced at one stage foster the development of skills and motivation at later stages (Cunha and Heckman 2007). If a child is not motivated to learn early on in life, the more likely it is that he or she will fail in social and economic life in adulthood. There is increasing recognition that malnutrition, poor health, and inadequate stimulation during early childhood can undermine educational foundations, restricting what children are able to accomplish. Deficits accumulated early on are very difficult and costly to reverse in later stages of childhood, ultimately hindering job opportunities and productivity and lowering future adult earnings (Grantham-McGregor et al 2007). Moreover, as malnutrition, poor health, and inadequate stimulation are highly correlated with maternal education, ability gaps between the advantaged and disadvantaged open up early in the lives of children (see for instance Paxson and Schady 2007) and persist throughout life. By one estimate, more than 200 million children under 5 years of age in developing countries fail to reach their potential in cognitive development (Lancet 2011). Poor children are particularly threatened because risks tend to occur together, and these risks have a cumulative effect. Grantham-McGregor et al. (2007) estimate that 217 million children under the age of 5 are disadvantaged (defined as stunted, living in poverty, or both). While this number represents 39 percent of all children under 5 in the developing world, the prevalence is much higher, at 61 percent, in Sub-Saharan Africa (SSA).

Indeed, the issue of early childhood malnutrition is of first order importance in SSA. Over the last two decades (1990-2010), the Sub-Sahara African Gross Domestic Product has grown at more than 4%, which is higher than the world average growth rate of 3.4% over the same period. Despite this significant economic growth, malnutrition rates remain very high and little improvement has taken place since the 1990s (García 2012). From 1990 to 2010, stunting has decreased by only 5% (from 43% to 41%), underweight has decreased by 12% (from 24% to 21%), and wasting has

increased by 6% (from 9% to almost 10%).¹⁵ These disappointing figures not only show the sheer scale of the problem but also that governments cannot expect malnutrition to vanish as countries grow, calling for specific policy interventions to reduce malnutrition.¹⁶ Moreover, these policy interventions, if they are well designed, will have very high payoffs as poor nutritional status has been shown to impair child's cognitive development, schooling and labour market variables. For instance, it is estimated that annually, Kenya loses US\$2.8 billion or approximately 10% of its GDP to vitamin and mineral deficiencies of its children. We review the evidence on the long-term effects of poor nutrition and discuss interventions that have been shown to be effective at improving nutrition.

On the positive side, there is growing evidence spanning a variety of disciplines including economics, psychology, sociology, and public health that early interventions promote schooling, reduce crime, foster workforce productivity, and reduce teenage pregnancy, thus contributing to help break the intergenerational transmission of poverty in the US (Grantham-McGregor et al 1991; Almond and Currie 2010).¹⁷ However, the longer society waits to intervene in the life cycle of a disadvantaged child, the more difficult and costly it is to remediate early deficits.

Despite this growing body of evidence - much of which we will review in this chapter - the Lancet Series on Child Development (2011) concluded that "*Governments are not allocating enough funds to early childhood development programmes*" and that "*Unless governments allocate more resources to quality early child development programmes for the poorest segment of the population, economic disparities will continue to exist and to widen*". Moreover, much social policy directed at the early years is based around formal preschool or school, and is often focused on improving cognition. Yet success in life requires not just intelligence, but also having the necessary social skills as well as adequate nutrition and health, issues which are particularly salient in low income countries.¹⁸ Policies targeted early on in life should thus be holistic in nature, addressing and targeting the multi-faceted nature of development. An additional challenge is to identify policies that are not only effective at improving child development, but are also cost-effective and can be implemented on a large scale. These challenges are particularly acute in developing countries.

The objectives of this chapter are to help inform the early childhood policies of African countries and to provide a basis for prioritising future research and policy initiatives. The chapter will review both seminal and ongoing large scale studies on early childhood investments in stimulation (home and preschool), nutrition and other areas with a view to identifying other innovative measures to ensure better care during early childhood. The chapter will do three things. First, it will: provide background on different inputs into the formative early years of a child, including the home environment and the

¹⁵ Stunting is low height-for-age and results from long term and accumulated deficit in nutritional status, wasting is low weight-for-height and can be the result of short term deficits in nutritional status. Underweight, which is low weight for age is a combination of height-for-age and weight-for-height indices.

¹⁶ This is not exclusive of Africa. Deaton and Drèze (2009) document that despite large increases in real income in India, anthropometric indicators have only improved very sluggishly.

¹⁷ Note our focus is on the period before formal primary schooling.

¹⁸ Noncognitive skills - personality factors, motivation, and the like - are an important channel of improvement (See Heckman, Malofeeva, Pinto, and Savelyev (2008)).

mother, preschool care, and health and nutrition; discuss the quantitative evidence on how policies affecting these different aspects of the early years affect children's outcomes in the longer term (section 2). Second, based on lessons learned from rigorous quantitative research in (2), it will propose a suite of early childhood interventions that are appropriate for the African context and that are promising in terms of improving children's development in the crucial early years. Third, it argues that ways of assessing the most appropriate delivery mode for early interventions constitute a central part of the research into determining what works best (section 3).

Before proceeding, note that in terms of (2) above, we try to provide evidence from studies that are best placed to show causal links, namely, randomised experiments.¹⁹ However, in some cases where there is a severe dearth of experimental evidence (highlighting the need for more), we also include relevant non-experimental studies. We make the distinction clear as we move through the chapter. Furthermore, we restrict reviews of the evidence to low and middle-income countries (LMICs), though note that there is also a considerable body of evidence for developed countries, particularly the United States (see Almond and Currie 2010 for a review).

4.2 Evidence on Early Interventions

In this section we review the home environment in the early years, including stimulation for children aged birth to three years (section 2.1) and maternal mental health/depression (section 2.2). We then discuss preschool care, covering approximately 3 to 6 years (section 2.3). We consider the links between these inputs and child mental and socio-emotional development. Whilst nutrition and health are natural outcomes also, we provide a more self-contained discussion of these in the latter part of the section (section 2.4).²⁰ Note before proceeding that each sub-section contains some background followed by a discussion of the evidence.

4.2.1 Improving early stimulation for young children

The home is one of the most important environments affecting a young child and there is a vast literature in related disciplines looking at the relationship between the home environment and child outcomes. There is a consensus that the family environments of young children are major predictors of cognitive and socio-emotional abilities, as well as of a variety of outcomes such as crime and health.²¹ As Heckman (REF) notes, the available evidence suggests that the quality of parenting is the most important scarce resource and that policies in the very early years should target the family. Here, we

¹⁹ This method measures differences in outcomes between a treatment population affected by an intervention, and a control population unaffected by an intervention. The random allocation of units to treatment and control ensures there should not be any systematic differences between treatment and control that affect outcomes.

²⁰ Note that whilst nutrition

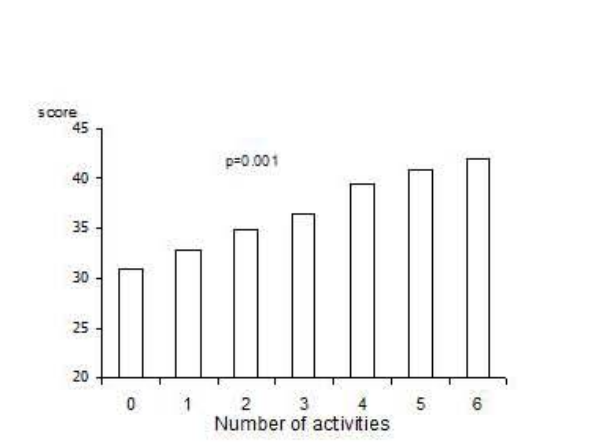
²¹ See evidence for the US such as Jencks and Phillips (1998), Cameron and Heckman (2001), Fryer and Levitt (2004,2006, 2007), Carneiro et al. (2005), Todd and Wolpin (2007) and others show how differences in home environments account for a large share of the black-white test score gap.

focus on two aspects of the home environment. The first (section 2.1.1) is related to how enriching the environment is in terms of psychosocial stimulation. The second (section 2.1.2) is focused on the mother, given the importance of developing a secure attachment to a primary caregiver.

4.2.1.1 Background

The effects of poverty on child development appear to be mediated through poor home stimulation, increased stress and poor health and nutrition (Bradley and Corwyn 2002; Paxson and Shady 2006). Stimulation in the home has been identified as an urgent, modifiable risk factor for child development (Walker et al. 2007). A potent example of the importance of stimulation comes from a Bangladeshi study in which mothers' reports of the number of play activities and number of play materials were associated in a dose-response manner with a child's language development at 18 months (Hamadani et al 2010; Figure 4.1 below).

Figure 4.1. Language comprehension score at 18 months by number of play activities



Source: Hamadani et al 2010

There is considerable evidence from developed countries that early childhood interventions can benefit poor children's development and some benefits are sustained through to early adulthood in social behaviour and educational achievement (Shonkoff et al, 2000, Olds et al. 2007). There is also a growing evidence base from developing countries that cognitive stimulation programmes aimed at increasing children's learning opportunities benefit children over the short term and there is some, albeit limited, evidence that these benefits are sustained over time (see Engle et al 2007, 2011, Baker-Henningham & Lopez-Boo 2010, Walker 2011 for a more comprehensive review). Furthermore, these approaches have been shown to benefit children exposed to a variety of biological and psychosocial risk factors including poverty (Klein & Rye 2004), institutionalisation (The St Petersburg-USA Orphanage Team 2008), stunting (Grantham-McGregor et al 1991), severe malnutrition (Nahar et al 2009), low birth weight (Walker et al 2004), pre-term birth (Bao et al 1999), iron-deficiency anemia (Lozoff et al 2010), HIV positive status (Potterton et al 2010), internal-displacement (Morris et al 2012) and disability (McConachie et al 2000) showing their flexibility and importance for even the most disadvantaged children .

In this section we discuss approaches that have been used in developing countries to promote the development of children under three years of age and present evidence of their effectiveness. Examples of successful programmes will be given and we will discuss the common elements of these programmes that promote their effectiveness. We will also discuss strategies for integrating early stimulation activities into existing services and community structures, including strategies for targeting special groups of children who are at particular risk.

4.2.1.2 Evidence from Interventions

4.2.1.2.1 Interventions targeting mothers

Training mothers in early childhood stimulation activities is a key strategy for enhancing development of children aged birth to three years as the majority of children of this age are cared for within the home environment. There are three main strategies that have been evaluated in developing countries: home visiting, individual counselling in health institutions, and in settings of mothers' groups.

A. Home Visiting Programmes

Home visiting interventions to promote early child development have been evaluated in different countries representing a variety of economic and cultural contexts (including South Africa, Ethiopia, China, Pakistan, Bangladesh, Colombia, Brazil and Jamaica) and for children with different risk factors (e.g. undernutrition, low birth weight, preterm, poor). All of these programmes have found significant benefits to child development with effect sizes ranging from 0.2 to 1 standard deviation. Benefits are most often found for children's mental development, benefits to motor development are more inconsistent. Interventions also generally benefit child behaviour and, very importantly, mothers' parenting knowledge and practices and the level of stimulation provided in the home improve with intervention. Changing parenting behaviours is likely to be important for sustainability of benefits and may lead to benefits to other infants and children within the family.

The home visiting intervention with the most robust evidence for short and long term effectiveness comes from Jamaica and has been adapted for use in Bangladesh and Colombia. Home visits are conducted (most commonly on a weekly basis) by paraprofessionals who receive between two to eight weeks pre-service training. The intervention is based on a structured, developmentally-sequenced curriculum targeting skills across all the developmental domains (gross and fine motor development, language development, cognitive development and social-emotional development). Home-made toys, books, pictures, puzzles, everyday household objects, crayon and paper, songs and games are used to teach and practice these skills. During each home visit, mothers are shown three or four play activities (e.g. home-made toy, a book, a song and a language activity) and they are asked to do these activities with their child between visits. Play materials are left in the home and exchanged at the next visit when new activities are introduced. The home visitor demonstrates each activity and then coaches the mother to practice the activity with her child. A key component of the visit is providing praise, support and encouragement to the mother and to encourage the mother to praise, support and encourage her child. Home visitors receive regular supervision involving meeting between visits to discuss each mother's and child's progress; the supervisor accompanies the visitor on home visits on a regular basis (usually monthly).

This home visiting intervention has shown robust effects to child development and to maternal knowledge and practices over the short term (Powell et al 2004, Walker et al 2004, Hamadani et al 2006) and there is evidence that benefits are sustained over time. The longest follow-up data comes from a study of stunted children aged 9-24 who participated in a two year home visiting stimulation programme. At age 17-18 years participants who had received stimulation had higher IQ, better reading scores, lower rates of school dropout, less anxiety and depression and fewer attention problems than participants in the non-stimulation group (Walker et al 2005, 2006) and at age 22 years they had higher IQ, better reading, maths and general knowledge scores, less depression and social inhibition and lower self-reported involvement in violent crime (Walker et al 2011). The magnitude and comprehensive nature of these benefits suggest that they are likely to make a meaningful difference to participants' life course in terms of employment and income earning potential and will possibly lead to better parenting behaviours on their part helping to break the intergenerational cycle of poverty and disadvantage. In one Jamaican study, the home visiting intervention was integrated into the services provided through primary health care centres. Community health aides employed in the centres conducted home visits for four to six children over a period of one year and benefits were once again found for child development and maternal knowledge and practices (Powell et al. 2004). Maternal depressive symptoms also reduced in the intervention group (Baker-Henningham et al 2005). Integrating the home-visiting intervention into the existing health service and using existing structures and existing staff should increase the potential for sustainability, but as only small numbers of children can be reached, the approach is likely to be most appropriate for children at high risk for poor development.

Home visiting interventions have also been successfully implemented in the African context. For example, in South Africa, a home visiting intervention aimed at improving maternal-child interaction and helping mothers to understand their infants' development, starting in late pregnancy and continuing until the infant was five months old led to more sensitive and less intrusive maternal behaviours at 6 and 12 months, fewer maternal depressive symptoms and increased the likelihood of infants having a secure attachment at 18 months (Cooper et al, 2009).

In Ethiopia, an intervention combining home visits with group meetings over a three month period was evaluated. The intervention involved videotaping mother-child interactions and strengthening the positive aspects of the interaction in addition to role playing and practice activities. Benefits of this intervention were found to mother-child interaction 3 months and one year after the end of the intervention and to child language after one year (Klein & Rye 2004). Children in the intervention group were also rated by their mothers as less aggressive, less anxious, less distractable and less hyperactive than children in the comparison group aged six years and benefits to mother child interactions were also maintained.

B. Individual Counselling in Health Facility Settings

Home visiting is a relatively intensive strategy and is unlikely to be feasible as a universal strategy to reach all disadvantaged parents with young children. Including advice on appropriate play and stimulation activities for mothers when they attend their regular health appointments is one strategy to extend the reach of early childhood stimulation programmes. This approach has been introduced as a global strategy to promote young children's development by the World Health Organisation and UNICEF through the development of 'The Care for Development Module'. The module contains

simple, easily readable and illustrated recommendations to parents to promote cognitive development (through play), social-emotional and language development (through communication) and responsive feeding interactions in addition to providing nutrition advice around breastfeeding and complementary foods and is delivered by health personnel in clinics. There is also a training manual for health workers to help deliver the intervention.

Unfortunately, despite its widespread use, there are few evaluations of the effectiveness of the programme. In rural China, the approach was found to benefit child development after 6 months of intervention (Jin et al. 2007) but the counselling sessions were 30-60 minutes long which is much longer than could routinely be conducted in most health centres in LMICs. In Turkey, paediatricians delivered the Care for Development intervention during two sessions only to mothers and children attending a child health clinic and mothers who received the programme reported more home-made toys and increased reading to children than mothers in the comparison group (Ertem et al 2006). An evaluation of Care for Development delivered on a large scale across three Central Asian countries also reported significant differences to parenting behaviours and child development (Engle et al 2011). The limited evidence available suggests that this low cost approach does have the potential to benefit parenting behaviours and child development. The challenge is to embed the intervention into health systems which are often already overburdened in LMICs and to maintain sufficient quality and quantity for the intervention to be effective.

Many countries include information on development milestones on child health cards and growth charts but there is limited information on the benefits of this approach to mothers' parenting practices or to child development from LMICs. Research on how this information should be presented to the caregivers for maximum effectiveness is necessary.

C. Mothers' Groups

Another strategy for increasing the reach of early childhood parenting programmes is through training groups of mothers in early stimulation activities. Mothers' groups can be convened across a variety of settings including health centres, schools, community centres; and early stimulation can be included in other services targeting mothers and/or children (e.g. skills training, immunisation services, nutrition services) making them an attractive approach for reaching larger numbers of disadvantaged children. Unfortunately, there are few evaluations of this approach. In Bangladesh, weekly education sessions for groups of 20 mothers over the course of a year resulted in benefits to mothers' parenting knowledge and practices but no benefits to child development (Aboud 2007). However, the intervention used primarily didactic techniques with few opportunities for role play, practice and demonstration. More recently, six group sessions on responsive feeding were added to an information-based parenting programme focusing on health, nutrition and child development (Aboud & Akhter 2012). The additional sessions were based on social-cognitive learning theory and included practice, problem-solving and peer support. The intervention resulted in significant benefits to the levels of stimulation in the home and to child language, in addition to nutritional benefits, demonstrating the importance of active mother involvement in the intervention. Several successful programmes have used a combination of home visits with mother's groups and although there is limited evidence of the effectiveness of mother's groups alone, existing research suggests that this could be a promising approach for improving disadvantaged children's development.

4.2.1.2.2 Day Care

Beyond the mother, another strategy for promoting young children's development is through the provision of high quality day care, an approach that is most appropriate in contexts with high levels of maternal employment and where alternative caregivers in the home are not available. In contexts where a significant proportion of disadvantaged children attend informal day care centres, interventions to improve the quality of care are important. There are few rigorous evaluations of day care provision from LMICs; moreover what evidence there is, is quasi-experimental. Two day care programmes that provided care from birth/six months have been evaluated, using community women as providers of the care. One programme was in Bolivia, where two to three caregivers, within their homes, looked after groups of up to fifteen children. Training was given in how to provide a stimulating environment. Benefits were found for motor, language and social-emotional development with more comprehensive benefits for the younger children (Behrman et al 2003). A similar programme in Colombia found benefits on children's language, maths and general knowledge scores and social skills. However, children with longer exposure to the programme were also more aggressive (Bernal & Fernandez, in press).

4.2.1.3 Integration with other services

Risk factors for poor development usually co-vary and disadvantaged children encounter multiple risks to their development in addition to inadequate stimulation. Integrated interventions that target the multiple risks to which children are exposed are required to optimise children's development. Important risk factors include poor nutrition (e.g. stunting, iron-deficiency anaemia), poor health and health related problems (e.g. preterm infants, HIV-infection, malaria, disability), and psychosocial factors (e.g. exposure to societal violence, institutionalisation, HIV affected families and children) and there are many existing programmes targeting these at-risk groups (further discussion is in section 2.4). Adding an early stimulation to these programmes can increase their cost-efficiency and helps target children most in need. However, a note of caution needs to be sounded as it is possible that the effectiveness of one aspect of an intervention can be compromised if too much additional information is provided. For example, in India, a complementary feeding intervention was shown to benefit child growth but when combined with additional information on psychosocial stimulation and responsive feeding, no benefits to child growth were found although child development increased (Vazir et al. 2013). Mothers receiving the complementary feeding intervention received 11 messages whereas mothers receiving the combined intervention received 27 messages and both groups received the same number of home visits. It is possible that the mothers in the combined intervention group were not able to implement all the recommended messages or were 'overloaded' with information. It is important that future research examines how to best combine intervention programmes to ensure that the families are able to benefit fully from their component parts. Although integrating early childhood stimulation into existing health and nutrition services is perhaps the most logical option for many low and middle income countries, other forms of integrated services are possible and some examples are provided below.

A. HIV Infected Children: In South Africa, caregivers of HIV-infected young children (less than 2½ years) were advised in the use of home stimulation activities during their regular 3-monthly clinic visits by physiotherapists based in the clinic. After one year of

intervention significant benefits of intervention were found for children's mental and motor development (Potterton et al 2010).

B. HIV Affected Children and Families: There are many community programmes for HIV-affected children including ones that provide support to older caregivers (e.g. Grandparents Action Support Project in Uganda (Nyesigomwe 2006) and comprehensive programmes for preschool children such as the 'Speak for the Child' programme in Kenya which includes home visits, provision of preschool fees, child health care, caregiver support groups and assistance to the community to improve human and financial resources (Lusk 2003). Rigorous assessments of the benefits of these programmes have not been conducted but programme evaluations have reported benefits to caregivers' child rearing practices. More robust assessments are necessary to evaluate their effectiveness.

C. Emergency Feeding Interventions for Displaced Families: In Uganda, an early stimulation programme was added to an existing emergency feeding programme for internally displaced mothers. The programme involved mother and baby groups which were conducted weekly for six weeks and involved psychoeducation on child development, discussion and practice activities. Up to three home visits were also conducted with most mothers receiving only one visit. Benefits of the programme were found for mothers' parenting practices and maternal mood (Morris et al 2012).

D. Severely Undernourished Children: Three studies have reported significant benefits from an early stimulation programme integrated into the care provided to severely undernourished children in hospital although the two of the evaluations included a combination of play sessions in hospital followed by home visits for a further 6 months (Nahar et al. 2009) to three years (Grantham-McGregor et al. 1987). One recent study in Bangladesh included play sessions at the nutrition clinic only. Mothers and children attended the nutrition clinic fortnightly for six months after discharge from hospital and a play session was conducted with the mother and child for one hour by a female health worker. Children participating in the intervention showed benefits to mental development and weight for age compared those in the non-stimulation group although no benefits were found for motor development or linear growth (Nahar et al 2012).

E. Institutionalised Children: Walker et al (2011) estimate that at least two million children are being cared for in non-parental group care. Children who are cared for in institutions from early in life are at risk across several developmental domains including physical, cognitive and social-emotional development and early age of entry and longer duration in an institution are associated with greater deficits. The preferred intervention for institutionalised children is adoption or foster care with appropriate training and support for the new caregivers (Van IZendoorn & Juffer 2006). Adoption has been shown to lead to marked benefits in child development. For example in Chile (Colombo et al 1992), a group of malnourished infants who were treated in a rehabilitation centre had developmental assessments on recovery and then some were adopted, some were placed in residential children's homes and some returned to their biological families. On follow up between 6 and 12 years of age the adopted children had gained an average of 16 IQ points whereas the other two groups had declined by 2 to 6 points.

However, there adoption and fostering may not be viable due to the sheer numbers of affected children, to cultural or economic barriers or due to the special needs that some of these children may have. In this case, increasing the quality of caregiver-child interactions through caregiver training and improvements to the institutional

environment benefits children's development. For example, in Russia, an intervention involving caregiver training (in how to promote sensitive, responsive and developmentally appropriate interactions with children) in combination with structural changes (decreasing the child-caregiver ratio) resulted in benefits to young children's social skills, positive affect, play behaviours and attachment status (St Petersburg-USA Orphanage Research Team 2008). Training in early stimulation without changing the child-caregiver ratio had more limited benefits suggesting that the structural changes were an important component. Ensuring children have access to a stable caregiver and continuity of care *and* providing a stimulating and developmentally appropriate environment are critical for young children in institutions.

4.2.2 Maternal Mental Health and Child Development

4.2.2.1 Background

Continuing with the home environment, there is robust evidence that maternal mental health has a significant influence on the cognitive and emotional development of the child. A key developmental task in infancy is developing a secure attachment to a primary caregiver, usually the mother. An infant who is securely attached is able to trust their mother and rely on this primary relationship from which to explore his/her surroundings in an appropriate manner. The most commonly researched mental health problem that women experience is depression and hence we focus here on the impact of maternal depression on early child development, while acknowledging that other mental health problems, especially those related to substance abuse, also have significant implications for child development.

Estimates of the overall prevalence of maternal depression worldwide vary between 10-35% in the first year post-partum (Ohara and Swain 1996). Specific to Africa, at the low end, Uganda and Zambia report 7.1% and 9.1% prevalence respectively (Cox 1983, Nakku et al 2006). Conversely, the prevalence in Burkina Faso is estimated at 44% and Zimbabwe at 33% (Baggaley et al 2007, Chibanda et al 2010)). Such large variation in estimates may be partly due to methodological reasons such as differences in assessment tools or timing of measurement. However, there is broad consensus that a significant number of children are exposed to maternal depression symptoms.

4.2.2.2 Pathways connecting maternal depression and early child development

While each culture has a unique way of describing symptoms (Bolton 2001)), the most universal symptoms of depression include fatigue, inability to concentrate, low mood, irritability and sleep problems. These symptoms, in turn, have a profound impact on a mother's behaviours towards her children (White and King 2011)).

Parenting

Depression compromises a mother's ability to parent effectively as she is not able to provide her child with the necessary levels of engagement and emotional connection. The fairly broad term of 'parenting' is a main mediator through which maternal depression impacts child development (Goodman et al 2011, Goodman and Gotlib 1999, Grantham-McGregor et al 2007, Harnish et al 1995). It includes the characteristics of mother-child interactions such as responsiveness and sensitivity to a child's cues, as well as emotional attachment. These parenting characteristics are closely linked with

both maternal depression and worse child outcomes (Black et al 2007, Tamis-LeMonda et al 2001, Appelbaum et al 1997, Schmid et al 2011).

A. Maternal Responsiveness. A mother's sensitivity to her infant's cues and her subsequent response form the basis of early infant development. Very simple mother-child interactions are the earliest forms of communication and stimulate a wide array of developmental processes. Research on mothers across diverse cultures has shown that mothers who are depressed do not respond as well to infant cues compared to mothers who are not depressed (Goodman and Gotlib 1999, Herrera et al 2004, Landry et al 2001). They are also less likely to stimulate their child cognitively through behaviors such as talking directly to their child or giving them things to look at and play with.¹⁴ Not being as aware of their infant's changing developmental capability, they are less likely to respond appropriately to specific cues (Herrera et al 2004). Lack of maternal responsiveness, whether due to depression or other causes, is a strong predictor of multiple cognitive and socio-emotional developmental outcomes (Tamis-LeMonda et al 2001, Landry et al 2001, Leigh et al 2011).

B. Maternal emotional bonding and infant attachment. In addition to a mother's ability to respond effectively to infant cues, her capacity to emotionally connect with her child in a positive way is critical to that infant's cognitive and, especially, socio-emotional development. In addition to being less responsive, depressed mothers report feeling less attached to their infants and are more likely to be disengaged (Tomlinson et al 2005, Siddiqui and Hagglof 2000, Attachment and development: 2005, Edhborg et al 2011, Ross et al 2011). They smile less and are less physically affectionate (Herrera et al 2004), with more frequent expressions of anger and other negative emotions (Maughan et al 2007). This, in turn, potentially impacts several domains of socio-emotional development. The most studied of these is infant attachment.

A key developmental task in infancy is developing a secure attachment to a primary caregiver, usually the mother. An infant, and consequently a child, who is securely attached is able to trust their mother and rely on this primary relationship from which to explore his/her surroundings in an appropriate manner. Conversely, dysregulation in attachment has been linked with behavioral problems in childhood and multiple mental health problems in adulthood Colonesi et al (2011). Infants of depressed women tend to exhibit such dysregulated attachment patterns, often as either avoidant or insecure attachment patterns (Roberts et al 1996). They also have more trouble with other psychological processes such as emotional regulation (Maughan et al 2007). Evidence has linked maternal depressive symptoms to child depressive symptoms, with such a disorganization of attachment during infancy being a chief mediator (Bureau et al 2009).

The lowered capacity for responsiveness and bonding with the infant are often present together with additional behaviors that are maladaptive from the child development's perspective. For example, depressed mothers are more likely to be intrusive and inconsistent in their interactions with their child (Vliegen et al 2009). Difficulties in creating and maintaining an organized and safe home environment further contribute to deleterious developmental outcomes (Zevalkink et al 2008).

While the majority of the research in this area comes from outside the African context, an increasing number of studies in Africa confirm the main relationship between maternal mental health and child development. For example, several studies in South Africa have focused on how mother-child interactions are altered in the context of

maternal depression. In a study near Cape Town, depressed mothers scored lower on maternal sensitivity and their 2-month old infants lower on a measure of active engagement (Cooper et al 1999). When these same families were followed up at 18-months, the now toddlers of the depressed moms were less likely to be securely attached. Secure attachment is a powerful indicator of a child's emotional development. Maternal intrusiveness as well as remoteness were hypothesized mediators (Tomlinson et al 2005, (2011))

C. Health related behaviours. In addition to these behaviors directly influencing a child's cognitive and socio-emotional development, mothers who are depressed are also less likely to engage in positive health behaviors. Maternal depression is an important, yet often overlooked, determinant of infant nutrition (Rahman et al 2008). For example, infants of depressed mothers tend to also be breastfed for shorter periods and are less likely to complete immunization schedules (Walker et al 2011). Studies from Nigeria and Ethiopia have additionally reported lower levels of hygiene behaviors and higher rates of diarrhoea in children of depressed mothers (Adewuya et al 2008, Ross et al 2011).

4.2.2.3 Evidence from Interventions

As most of the evidence relating to maternal mental health and child development is non-experimental and based on observed associations, we make the distinction between the two types of study in what follows.

Non-Experimental Evidence

The detrimental effects of maternal depression exposure on the child start early and persist throughout the life course (Walker et al 2007, Patel et al 2002, Murray and Cooper 1997, Hussain and Nauman 2010, Affonso et al 2000, Goodman et al 2011). This deleterious impact is thought to be more severe in low resource settings where there are already more demands on the mother (Walker et al 2011), and especially in contexts where there is low social support (Rafferty et al 2011). Consistent with this, studies from LMICs report that infants and children of depressed mothers score lower on multiple cognitive and socio-emotional developmental assessments (Walker et al 2007, Black et al (2007), Parsons et al 2012, Galler et al 2000). In addition to overall measures of cognitive, specific cognitive deficits include language delays (Appelbaum et al 1999), an increased stress response Ashman et al (2002), and lower levels of attentiveness (Hernandez-Reif et al 2006). Specific socio-emotional deficits include insecure attachment among infants (Schechter and Willheim 2009); externalizing and internalizing behaviours among toddlers (Murray and Cooper 1997, Goodman et al 1999, Bureau et al 2009) leading to higher risk of multiple neuropsychiatric and physical disorders among adults (Ban et al 2010, Prince et al 2007).

The majority of studies specific to LMICs come from South Asia (Patel et al 2003) but there is also increasing evidence from Africa (Servili et al 2010, Hadley et al 2008, Tomlinson et al 2005). The findings of the connection between maternal depression and early child development are consistent across countries and cultural contexts. For example, a study in Ethiopia reported that young children of depressed mothers had an overall developmental score that was almost 10% lower when compared to children of non-depressed mothers (Hadley et al 2008).

Experimental Evidence

Ameliorating the negative impact of maternal depression on the child has become an important focus of a growing number of interventions. While the exact impact of maternal exposure on specific developmental milestones varies by timing and duration of exposure, there is evidence that children can rebound when symptoms improve (Landry et al 2001). Interventions can begin in the prenatal period and often target the first few years of a child's life as this is an especially sensitive period of development and one where the largest deleterious impact of depression has been observed (Kinsella and Monk 2009, Gavin et al 2005, Lundy et al 1999).

The strongest evidence comes from interventions that combine psychosocial approaches to the treatment of maternal depression together with an explicit focus on improving parenting behaviours (Rahman et al 2008). This combination seems to be more efficacious in the long term than either approach alone. Such interventions combine traditional aspects of psychotherapy with parenting skills training which, in turn, reduce depressive symptoms and improve parenting behaviors such as maternal responsiveness or breastfeeding (Rahman et al 2008, van Doesum et al 2008). There is mixed evidence about the impact of pharmaceutical only treatment of maternal depression on mother-child interactions and child outcomes. The goal of successful interventions is to not just reduce current depressive symptoms but also decrease the risk of future episodes to truly improve child outcomes (Sutter-Dallay et al 2011).

4.2.3 Preschool Programmes

Having discussed the home environment and the role of the mother in promoting child development, we next consider the period after early childhood and the role of good quality preschool care in shaping development.²² This section covers day care programmes and embraces children from 3 to 6 years.²³

4.2.3.1 Background

Preschool care is a way of preparing children more formally for school, or increasing their school readiness. Preschool programmes focus on socialisation (e.g. group cooperation, following discipline and rules), fostering cognitive development, and supporting the child's healthy physical development. There is evidence that enhanced school readiness improves schooling outcomes later on (REF??).

However, enrolment in preschool care is very low throughout much of Africa. In Mozambique for instance, only 4 percent of children are estimated to be enrolled in preschool, and the vast majority of these are in urban areas and amongst the more affluent populations (World Bank, 2011). Whilst the sub-Saharan African rate rose from 12 per cent in 2000 to 17 per cent in 2008 (UNESCO 2010a), just 2 out of 5 children live in areas with access to preschool programmes, and the discrepancies are marked

²² Other tools include conditional cash transfer schemes and educational media, beyond the scope of the chapter. For instance, interactive radio instruction has been used in Bolivia, Honduras, Indonesia, and El Salvador at scale to improve the quality of the preschool experience, although it has not been assessed (Ho and Thukral 2009).

²³ Note that two day care programmes have also been reviewed in section 2.1.2.2, given they cover children from birth.

across urban and rural areas. The low participation rates likely reflect a combination of supply-side constraints (lack of available programmes/preschools) and demand-side constraints (e.g. lack of information among parents about the benefits of preschool). On supply, the Lancet Series on Child Development (2011) states that the Organisation for Co-operation Development (OECD) estimates a minimum of 1% of GNP needs to be spent to ensure quality early child development services; OECD governments spend an average of 2.36%. Some central and eastern European and South American countries budget 0.4% for pre-school education, while the figure is as low as 0.1% in Kenya, Nepal and Tajikistan. Nicaragua and Senegal spend less than 0.02%.

From a policy perspective, the overall challenge is to ensure that preschools reach the most disadvantaged and do not reinforce inequalities of opportunity and outcome. More specific challenges include, on the supply side, ensuring quality - hiring and retaining skilled personnel, strong governance, availability of suitable pedagogical materials, having a suitable curriculum. On the demand side, the challenge is in making it attractive and affordable for parents.

There are, broadly speaking two types of “day care” model (Lancet, 2011). The first is institutional (formal) day care, the second is community-based (informal) care. In the institutional model, day care is generally linked to schools or offered by private providers, with curricula, learning materials, paid and trained teaching staff, and a fixed classroom site (often within a primary school). The community-based model, on the other hand, tends not to have professionally trained teachers and might have locally adapted/temporary sites.

In terms of evaluating the effectiveness of such programmes, an important issue is the self-selection of families into preschools which makes identification of a credible counterfactual difficult. Randomising is often not feasible. As a result, in terms of the available evidence on preschool programmes, to the best of our knowledge all but two preschool programmes are non-experimental. We first discuss the evidence from non-experimental studies, and then devote some space to the discussion of two randomised preschool interventions, one of which is in Africa.

4.2.3.2 Evidence on Preschools

As noted, the evidence on the effects of randomised preschool interventions is very scarce, so we include separately a discussion of the non-experimental evidence, followed by the available experimental evidence.

Non-Experimental Evidence

In terms of institutional day care (preschools), Berlinski et al (2008) evaluate the impact of the expansion of public preschool services in Uruguay on school attendance and years of schooling of children between the ages of 7 and 15. They found that having attended at least one year of preschool in Uruguay had a positive effect on primary school attendance and years of schooling. Berlinski et al (2009) evaluate the impact of the expansion of public pre-primary provision in Argentina on maths and Spanish test scores and student behaviour in grade 3. They found that an increase of one preschool place per child increased test scores in grade 3 by 8%.

Other studies comparing (institutional) preschool attendance with non-attendance include Aboud et al (2008) for Bangladesh and Mwaura et al (2008) for Kenya, Uganda

and Zanzibar, and also point towards preschool attendance being associated with better test scores.

Another set of studies compares improved preschools with non-improved preschools. The general finding is that being enrolled in higher quality or improved preschool programmes compared with standard programmes is associated with better learning outcomes. Examples of effective improvements included structured pre-reading programmes in Bangladesh (Opel et al, 2009) and Costa Rica (Rolla San Francisco et al 2006), formal rather than informal preschools in China and Cambodia (Rao et al, in press), a teacher training programme in Jamaica (Baker-Henningham et al, 2009), child-centred methods or interactive teacher-child methods of instruction in Bangladesh (Moore et al, 2008) and interactive radio or audio instruction to guide classes for teachers in Zanzibar (Morris et al 2009).

Experimental Evidence

Experimental evidence of the effects of preschool care is scarce, and we are aware of just two randomised studies, one in Jamaica and the other in Mozambique.

Baker-Henningham et al (2009) conducted a pilot study of the Incredible Years Teacher Training programme, where five preschools in Kingston, Jamaica were randomly assigned to an intervention or control. Treatment involved seven whole-day teacher workshops using the Incredible Years Teacher Training programme supplemented by 14 child lessons in each class. Significant benefits were found to teachers' behaviour with increased positive behaviour and increases in the extent to which teachers promoted children's social and emotional skills. Significant intervention benefits were found to ratings of child behaviour with an increase in children's appropriate behaviour and in children's interest and enthusiasm. The intervention was also found to benefit classroom atmosphere with increases in opportunities provided for children to share and help each other and in teacher warmth.

As noted earlier, Martinez et al (2012) is, to the best of our knowledge, the only other evaluation of a randomised pre-school intervention, and the first ever in a rural African setting. In 2008, Save the Children implemented a centre-based community driven preschool model in rural Mozambique. The project financed the construction, equipment and training for 67 classrooms in 30 communities, costing approximately \$2.47 dollars per student per month. As part of the experimental impact evaluation, the 30 intervention communities were selected at random from a pool of 76 eligible sites.

The evaluation found that participation in the preschool programme resulted in significant improvements in a number of child development outcomes broadly measuring "school readiness", including cognitive and problem-solving abilities, fine-motor skills and socio-emotional and other behavioral outcomes. It found no effects on some key measures of communication and language development, which continued to be extremely low for both groups.

4.2.4 Improving Nutrition

4.2.4.1 Background

As noted earlier, despite significant economic growth over the last two decades, malnutrition rates remain very high in Sub-Saharan Africa and little improvement has taken place since the 1990s (García 2012). We start by reviewing the evidence on the long-term effects of poor malnutrition in childhood and then call attention to a well reviewed nutrition intervention which yields a benefit-cost ratio of 15.0.

There are strong associations between poor foetal growth or stunting in the first 2 years of life and shorter adult height, less schooling, reduced economic activity and - for women - lower offspring birth weight (Victora et al. 2008). However, these associations may not reflect a causal mechanism but may be driven by a third underlying factor such as poverty which can affect both nutrition in childhood as well as adult outcomes. Whilst there is an array of non-experimental evidence, there is also considerable evidence better placed to show the causal link between childhood nutrition and adult outcomes, including natural experiments (such as famines) or interventions. We thus focus on the experimental evidence and review evidence on the causal link between nutrition and long term outcomes.

4.2.4.2 Evidence from Interventions

Malnutrition starts *in utero* and indeed low maternal body-mass index is associated with intrauterine growth restriction (Fishman et al. 2004). Famines provide a form of natural experiment to estimate the effect of *in utero* nutritional status and adult outcomes because famines usually have well-defined time and geographic limits, and hence it is relatively easy to know who was exposed to a famine *in utero*.²⁴ Most of the existing evidence comes from two well known famines: the Dutch “Hunger Winter” which took place in the Netherlands in 1846-47 as a result the potato blight, and the Chinese famine as a result of sharp falls in grain output due to the failure of Mao’s economic policy known as The Great Leap Forward (Li and Yang 2005). The medical literature has shown how exposure to either of these two famines in utero resulted on significant long-term effects on adult morbidity.²⁵ These results are consistent with the *Barker hypothesis*, according to which health in adulthood may be “programmed” by health *in utero* (Barker 1992) as well as by the hypothesis according to which the famine triggers excessive maternal stress which might also have long term effects on health (Gluckman and Hanson 2005).

Recently, the literature is going further and has investigated the effects of exposure to a famine (as a marker of low nutritional status) *in utero* on cognitive development, educational attainment and labour supply. Almond et al (2007) has shown that both

²⁴ A shortcoming of using famines is that high infant mortality which is associated with some famines might positively bias the survivors, making it more difficult to find effects of the famine on later outcomes. This might explain the conflictive results obtained from the analysis of the 1866-1868 Finish famine as well as the siege of Leningrand in 1941-1944 (Lindeboom, Portrait, and van den Berg 2010).

²⁵ For references on the effect of exposure *in utero* to the Dutch *Hunger Winter* on adult morbidity see Ravelli et al. 1998, Roseboom et al., 2001, Painer et al., 2005, Lumey et al. 2007). For the case of the China’s great famine, see Meng and Qian 2006, Chen and Zhou 2007.

men and women were 9% and 7.5% respectively more likely to be illiterate, and 6% and 3% respectively more likely to work if they were exposed to 1959-61 China's great famine *in utero*. Scholte, van den Berg, and Lindeboom (2012) find a significantly negative effect of exposure to the Dutch *Hunger Winter* during the first trimester of gestation on employment outcomes 53 or more years after birth. Lindeboom, Portrait, and van der Berg (2010) also find that life expectancy after age 50 is reduced on average by 4 years for men and 2.5 years for women if they were exposed to the Dutch *Hunger Winter*.²⁶ Almond and Mazumder (2011) have also shown the importance of nutrition *in utero* on later adult outcomes by exploiting exposure of the fetus to the Islamic holy month of Ramadan in when diurnal fasting is common among pregnant women. They find that Muslims in Uganda and Iraq are 20 percent more likely to be disabled as adults if early pregnancy overlapped with Ramadan (with larger effects for mental or learning disabilities). Hence, they conclude that even relatively mild prenatal exposures can have persistent effects.

Although the *in utero* period has been shown to be critical for long term outcomes, improvements in nutritional status in the first three years of life have also shown to have large payoffs in terms of long term outcomes. For instance, Maluccio et al (2009) examine the data from a randomized experiment in Guatemala in which four villages were randomly selected into receiving a highly nutritious supplement or a standard one between 1969 and 1977. The children were then follow-up as adults until 25 years after the intervention ended. The authors find that taking the highly nutritious supplement before the 36 months increase test scores in a range that vary between 0.54 and 0.71 SDs, for both men and women even 25 years after the intervention finished. Women that benefited from the highly nutrition supplement also increased schooling in 2.5 additional years. Using data from the same experiment, Martorell et al. (2010) also find that men who were exposed to the highly nutritional supplement increased wages in 42%.

In the context of randomized conditional cash transfer program in Nicaragua, Barham, Macours, and Maluccio (2013) compare the anthropometric and cognitive outcomes of boys exposed to the programme *in utero* and during the first 2 years of life to those exposed when they were 2-5 years old. Although they find that both groups have the same height at 10 years of age despite an initial difference in height between these two groups (and hence showing the catching up on height is possible), there was no catch-up on cognitive outcomes and those exposed in the first 2 years of life had better cognitive outcomes at age 10 than those who were exposed later (2-5 years old). Their results confirm that interventions that improve nutrition and/or health during the first 1,000 days of life can have lasting positive impacts on cognitive development for children.

Barham (2012) examines the medium-term effects of a maternal and early childhood health and family planning programme in Bangladesh on cognitive functioning. She finds that being exposed to the program increases in 0.39 standard deviations the

²⁶ Using data covering the period 1812–2000 in the Netherlands, van den Berg, Lindeboom and Portrait (2006) also find that being born in a recession increases mortality later in life. Van den Berg et al. (2010) also find that individuals who experience a stroke in old age witness a strong subsequent decline in cognitive abilities, and that this decline is stronger if the individual was born in the midst of a recession as compared to a boom. However, it is more difficult to ascertain whether this is driven by poorer nutritional status associated to recessions or to any other features that might flare up during recessions (e.g. maternal stress).

cognitive functioning score of children who had been exposed to the programme up to 14 years ago.

The previous evidence highlights the importance of improving nutrition *in utero* and first two years of life for long-term outcomes, including health, cognitive functioning and labour supply. In section 3, we will review the state-of-the-art recommendations on highly cost-efficient interventions to improve child nutrition.

4.3. Designing Policies to Improve Early Outcomes in Africa

In light of the evidence reviewed in the preceding part of this chapter, we here provide a discussion of policy issues that are relevant for promoting child development in the early years, along with a word on the delivery of ECD programmes, and a discussion of policies specific to nutrition and health. In section 4, we go on to provide a discussion of pertinent research questions that remain unanswered.

4.3.1 Policy issues common across the early childhood period

Drawing on the evidence from rigorous studies of policies and programmes in the academic literature, we summarise the key considerations in drawing up policies targeted at the early years and the most important components of such programmes.

The provision of early stimulation and nutrition programmes for young, disadvantaged children and their families is critical to prevent the loss of developmental potential of large numbers of African children with the subsequent loss of human and economic potential at the national and regional level.

Stimulation and nutrition programmes need to start early in a child's life and be of sufficient intensity and duration to make a difference to their development. Quality is also a critical aspect of programme effectiveness and the quality of early childhood programmes needs to be monitored closely as they are scaled up to reach larger numbers of children.

It is important that early years programmes reach the poorest and most disadvantaged children and families, which will require appropriate targeting. While universal programmes can be made to all low income families in a specific area or region, children and families living in the most disadvantaged circumstances may require additional services and/or special attention to ensure that they are able participate in programme activities.

It will be important that each government has policies in place to support the development and implementation of early activities in addition to a regulatory framework within which these activities should operate. This will help to ensure a coherent approach. In addition, cross-ministry working will be essential as health, education and social services will need to work together to ensure the holistic needs of the youngest children are met.

Young children's development is multi-dimensional (e.g. cognitive, motor, language and social-emotional domains) and multi-determined (e.g. influenced by health and nutritional status, parenting characteristics and home environment & neighbourhood

characteristics). Furthermore, risk factors for poor child development covary so that children exposed to unstimulating home environments are often exposed to additional risks such as poor health, poor nutrition, poverty and a caregiver suffering from stress or depression. The implications of this are that integrated programmes are necessary which target the multiple risks faced by children and their families. Some examples of these programmes were provided in the previous section, for example, combining early stimulation with nutritional supplementation is necessary for families facing food insecurity and combining early stimulation with paediatric care is necessary for children with chronic health problems. As children are particularly sensitive to the effects of under nutrition up to the age of two years, integrating nutrition and early stimulation is particularly important for infants and toddlers.

Treatment of maternal depression should be included as a component of an integrated early childhood development programme/package and not a separate activity. Rather than being presented as a medical 'treatment for depression' which often carries a negative connotation it should rather be presented more positively, for example, as skill building to ensure health of the baby and the mother. Such integration not only makes it easier for a woman to continue treatment but also reduces any potential stigma associated with depression. The treatment of depression is expected to significantly improve the overall impact of the other early stimulation/nutrition/health promotion programme components.

Given the expected high prevalence of maternal depression (10-35%), routine screening for maternal depression can also be integrated into health/nutrition/early stimulation programmes and should not be a stand-alone activity. Ideally, the screening would occur both during pregnancy and in the first 2-4 months post-partum.

The training of a cadre of early childhood workers needs to be considered at the national, regional and local level and involves decisions on who will be trained, by whom and to what level. Paraprofessional staff can effectively deliver early stimulation activities with appropriate training, support and supervision. The key ingredients in early stimulation programmes are effective initial training, a structured curriculum, ongoing supervision within a supportive framework and periodic booster training. Similarly, paraprofessionals can be trained in psychological therapies given evidence on their effectiveness for mild and moderate maternal depression without pharmacological treatment. These paraprofessionals may be the same, or different, individuals delivering other ECD components within an integrated framework. Clear referral routes to psychiatrists should be in place in the case of severe or unresponsive mental illness, suicidality, etc. Clear continuity of care plans should also be in place after the mother-child dyad 'ages' out of the ECD programme. Again, the key components are intensive training, followed by supervision, booster trainings, appropriate compensation, and opportunities for advancement.

Retention of staff within early childhood programmes is a key consideration and ideally an accredited form of training would be available to early childhood workers. Retention is most likely when staff feel valued for the work they do, receive adequate compensation and have the potential for advancement and promotion.

The most successful programmes promote active parent involvement and focus on both the mother and child. The family needs to be considered as a powerful influence in a young child's life. For instance, involvement of parent is crucial to the success of early stimulation activities; the provision of preschools does not remove the need for

parent training programmes. Indeed, day care and preschools can be used to reach out to parents, thus increasing the involvement of parents and thus the effectiveness of preschool; programmes need to target not only the development of the child and the mother's caregiving practices but also the mother's well-being and mental health; ECD programmes that include a social support component for mothers are especially effective at reducing maternal depression symptoms. This can be integrated into existing programmes by facilitating interactions among the mothers themselves.

Relating to preschool, one of the most important aspects of such care for young children is the quality of the day-to-day interactions between the caregiver and the children and the quality and appropriateness of the activities conducted. While attention to the physical aspects of centre-based provision is important (e.g. class size, physical structure, teacher training etc.), the physical aspects alone are insufficient for promoting early child development and training teachers/caregivers in developmentally appropriate activities and interactions is a critical aspect of quality.

In Africa, because children from wealthier households are more likely to attend preschool, they will reap the developmental benefits it provides. Even if children from poorer households have the opportunity to attend preschool, they may not benefit as much as their wealthier peers because of the fact that they are more likely to attend lower quality schools. Poor quality preschools have the ability to cause harm (i.e. worsen children's development and/or behaviour compared to children who do not attend preschools). Hence paying attention to the quality of preschool services is absolutely essential. For this reason correct targeting is essential, as is removing/reducing barriers to attendance such as those relating to cost.

The evaluation of the effectiveness of early stimulation/nutrition activities needs to be considered at the design and planning phase and prior to implementation. Evaluations need to include an impact evaluation of the effectiveness of the programme in changing caregiver behavior and child development. However, an ongoing process evaluation should also be included which may involve documenting the quantity and quality of services delivered, the level of monitoring and supervision provided, the characteristics of the families participating in the programme, difficulties and challenges faced in implementation and the views of the caregivers and early childhood personnel about the programme.

4.3.2 On the Delivery of Programmes

One cannot be prescriptive about the mode of delivery for ECD programmes, as the optimal mode of delivery for programmes will depend on the existing infrastructure and the pre-existing government and community services of a region, the financial and human resources available and the social and cultural context. For instance for early stimulation programmes, different approaches include mother's groups, home-visiting, face-to-face counselling in health centres, the use of media such as radio and TV programmes or a combination of these. In urban areas where a high proportion of mothers are in work, provision of high quality day care may also be necessary.

One should try to tap into pre-existing services for delivery of programmes. For instance in many countries, the only universal service for children under the age of three is through the health sector and it would therefore seem appropriate to integrate early stimulation and nutrition components into the existing pre-natal, post-natal and child health services. However, in many African countries the primary health care

services may be already overstretched and care needs to be taken to ensure the early stimulation activities can be delivered with sufficient quantity and quality in addition to ensuring that the quality of the existing primary health services are not compromised through the extra workload. Other potential points of integration would be with pre- and primary schools, existing community groups and through non-governmental community services for example (also relevant at preschool level, depending on available preschool facilities).

4.3.3 Policies on Nutrition and Health

Specific to nutrition and health, the policy suggestions that follow are taken from Bhutta et al. (2008), which concludes that there is sufficient evidence to support the large-scale implementation of the following policies:²⁷

Interventions to improve children's food intake including education about complementary feeding in populations with sufficient food, provision of food supplements in populations with insufficient food, management of severe acute malnutrition according to WHO guidelines (including ready-to-use therapeutic food which can be used in community settings), breastfeeding promotion strategies (due to their effects on survival rather than stunting).

Micronutrient interventions for children including supplementation of vitamin A (in the neonatal period and late infancy), preventive zinc supplements, zinc in management of diarrhoea, and universal promotion of iodised salt.

Micronutrient interventions for pregnant women including iron folate, multiple micronutrients, and calcium supplementation, iodine supplementation through iodisation of salt.

Other interventions including interventions aiming at increasing and improving hand washing habits.

4.4. Research Questions

In this section, we provide a list of pertinent areas where research is needed in order to more effectively design policies to improve the development of children in the formative early years.

1. Evaluating the relative cost-effectiveness of various approaches to delivering early childhood programmes is important to provide information to government and international funders about how best to deliver these services. This includes examining factors such as the optimal age for starting early childhood programmes, the optimal duration and intensity of programmes, different modes of delivery (e.g. home visiting versus counselling versus parent groups versus preschool) and the cost-effectiveness of combined versus individual programmes. This will require that the different

²⁷ See Bhutta et al. (2008) for extensive details. They also provide details of interventions which are recommended in specific settings such as deworming, insecticide treated nets, delayed cord clamping, and iron supplements (not suitable for areas where malaria is endemic).

approaches are compared using rigorous evaluation designs and following participants (and non-participants) over time to monitor the extent to which initial benefits from programmes are sustained. Which approaches to compare is probably country and context-specific. For instance, if a country does not have a clear strategy on early childhood programmes yet, it makes sense to start by comparing the mode of delivery (e.g. home visiting versus counselling), while comparing optimal age for starting and optimal duration makes more sense once the overall strategy on mode of delivery has been defined.

2. There is a need for research to determine what works best for whom. Some children and families may benefit more from one approach than another and some may need longer, more intensive interventions before significant benefits are obtained. Conversely, some disadvantaged children and families may require less intensive interventions especially if they are exposed to fewer threats to child development. It is likely that targeted interventions for children at greatest risk may need to be embedded into a universal framework of interventions that are available to all disadvantaged children but there is little research from low and middle income countries to corroborate this.

3. Research is also required to inform the most effective strategies to reach the most disadvantaged children and their families. Initial engagement, retention, active participation and compliance of families in early childhood programmes is necessary and strategies to motivate families of young children may be needed which may involve monetary or non-monetary incentives for either families or workers delivering the programmes or both (see also point 5 below).

4. While there is substantial evidence that early childhood stimulation programmes lead to significant and meaningful benefits to child development and parenting practices in LMICs, there is little information on how these programmes can be best scaled up while maintaining sufficient quality. Identifying mechanisms for wider dissemination of these interventions so that they are sustained through routine funding sources is a challenge for the field. There are a growing number of successful examples of large scale programmes and implementation research is required to allow these successes to be replicated across varied cultures and contexts.

5. Given the problems of sustained take-up and effort when programmes are scaled up, there is an urgent need to establish whether incentives can be used to promote the engagement of families as well as that of the workers delivering the programmes. If the major suspected hurdle is low motivation by workers delivering the programme, either monetary or non-monetary incentives would be payable to those workers with satisfactory performance measures (which could be either input-based such as number of visits or output-based such as gain in nutritional status). On the other hand, if the major hurdle is demand driven, incentives might be better directed towards families. While there is good evidence that conditional cash transfers are effective at promoting families' engagement, there is very little evidence on the relative merits of monetary and non-monetary incentives to workers delivering the programme. Although collecting performance measures can sometimes be costly, innovative approaches such as "Movercado" in Mozambique (which use mobile phone communications to collect performance measures and pay the incentives) are costless and very promising.²⁸

²⁸ <http://movercado.wordpress.com>. We thank Iulian Circo for bringing this to our attention.

6. The need for integrated programmes that cater to the co-occurring risk factors faced by young children and their families is well-recognised. However, there is an urgent need for research into how to integrate programmes to ensure that each individual component maintains its effectiveness and how to allocate resources to take advantage of the joint approach (e.g. can the same staff deliver more than one aspect of the intervention and/or can the interventions be conducted at the same time to maximise efficiency). Within this, while it is known that maternal depression reduces the uptake of child health and development promoting behaviours, the increased cost-effectiveness of an overall ECD intervention package associated with the successful treatment of depression remains unknown.

7. The use of media and mobile phone messages to disseminate parenting messages and/or to provide educational programmes directly to children has had limited attention in LMICs. In areas with a large rural population and where coverage of services is low, media interventions may have a useful role to play in promoting child development. Literacy levels permitting, mobile phone messages can be used to disseminate concise and important messages directly to parents, as well as to provide a way for parents to respond to the messages disseminated through media (increasing the interaction between media and parents, hence engaging parents further). Media and mobile communication can also be used to facilitate the task of local workers delivering the programme (e.g. designing videos on specific topics that can be used by the facilitator on their visits, as well as short auditions delivered through mobile phones).

8. The use of short term initiatives to trigger long-term changes. Procrastination is a common problem that communities face when implementing large-scale programmes. The use of the Rapid Results Initiative consists of the community being coached to attain a simple and concrete goal in 100 days (e.g. that all mothers show books to their young children at least once every day). Successful communities are then coached to attain 2 goals in the next 100 day cycle. Usually some monetary resources are required to implement the goals, which are transferred by the relevant authorities. The Rapid Results Initiative has already been implemented in Eritrea and Kenya but research on its effectiveness on promoting early childhood development using rigorous evaluation methods is urgently needed.²⁹ In particular, determining the optimal time length of a cycle (50, 100, 200 days) will be crucial to underpin and understand the effectiveness of the approach.

9. Relating specifically to preschool, research is needed on determining the optimal number of years of preschool attendance. For instance, are the benefits for attending for multiple years additive, or is one year sufficient to prepare children for entry into primary school? What are the benefits of incorporating health, nutrition and/or parenting interventions onto preschool provision and what are the most effective ways of achieving this? What effect does managing the transition from early childhood programmes to primary school have on child development and what are the most effective means of preparing the child, the family and the primary school for the transition?

10. Relating to maternal depression, there is likely to be regional/cultural variation in which aspects of development (e.g. socio-emotional vs. language) are most impacted by maternal depressive symptoms. Research on these specific pathways would allow

²⁹ http://copmfdrafrica.ning.com/profiles/blogs/results-for-kenyans?xg_source=activity

for a more targeted intervention that can respond to a particular child's potential weaknesses.

11. Although it is largely recognised that early interventions are the most cost-effective, whether or not it is possible to catch-up remains an open question. Research on this issue is very limited so far because it requires comparing the outcomes of early-treated children with those of children treated later on. The scant available evidence points in the direction that children who receive a nutrition intervention when they are 3-5 years old attain similar nutritional status around age 10 as those who were treated between 0 and 2 years of age. However, the loss on cognitive development was not recuperated, suggesting that catching up in terms of cognitive development might be more difficult, at least through nutritional interventions. More research effort is required to assess the robustness of these findings, as well as to establish whether it is possible to catch up on cognitive development through interventions that provide stimulation to the children.

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Chapter 5 Linking Education with Job Creation

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5.1 Introduction

That young people want jobs and that there are no jobs for them are central political issues in most countries today across both the developed and less developed world. Unemployment rates for young people are usually higher than for those older. However, the aftermath of the 2008 financial crisis has pushed up unemployment rates in many developed countries so that the problem of unemployment, while seen to be acute for the young, is certainly not confined to them. The Arab revolutions which began in February 2011 are seen to have at their core the dissatisfaction of young people with their opportunities.

This was the background to the World Development Report for 2013 which focused on what has come to be termed “the jobs agenda”. Key questions for this agenda are: Why is the lack of jobs concentrated among the young? How can we create more jobs? And, if we can answer those questions, what sort of jobs do we wish to create, both for the young and others not so young?

It is not simply jobs which are the focus of policy concern; it is the quality of those jobs. Quality has many dimensions which include the regularity of employment in the job, whether it brings entitlement to social security and pensions, and whether there is a profile of possible promotion within the job with increased pay with tenure. Such higher quality jobs are associated with higher skills and the dissatisfaction of young people with their opportunities is, in large part, dissatisfaction with the lack of jobs which will productively use the skills acquired through increased education.

Recent reviews of the evidence of labour market developments in sub-Saharan Africa (SSA) have pointed to a pattern by which job growth appears to have been most rapid in urban self-employment, not wage employment (see Kingdon, Sandefur, and Teal 2006). Much of the data on which these studies were based only cover the period up to 2000. Using more recent data for Ghana suggests a change in this pattern in the more recent period when wage jobs in small firms have grown very rapidly. Employment in small firms, which is the low paying occupation within the urban sector, increased from 2.7 to 6.7 per cent of the population, an increase from 225,000 to 886,000 employees between 1999 and 2006. Jobs in total have been increasing in line with the population but the proportion of relatively low paying ones increased markedly during this period.

Broadly speaking, public policy has been much more successful at increasing the supply of education than the supply of jobs for the educated in sub-Saharan Africa (and in other regions as well) and it is the increasing mismatch between the increased supply of such labour and the demand for educated labour by firms which will be the focus of this chapter. This potential mismatch has two dimensions. One is the availability of jobs in urban relative to rural areas and the second is the type of jobs

being supplied within the urban sector. This chapter also investigates the appropriateness and quality of human capital being accumulated.

The chapter will address the issue as to how education and labour market outcomes are linked and will also highlight areas where more needs to be understood. The "jobs agenda" which apparently flows from the Arab Spring, clearly the most important political development in the Arab world for half a century, is one driven by the concern of urban based youth. Our objective in this chapter is both to address those concerns and put them into a wider context. Many young urban people lack jobs, but they are not nearly as poor as those who have jobs in rural areas in much of sub-Saharan Africa. Jobs are clearly important but so are the incomes from the jobs people do have. Why are the incomes available from rural based jobs so low? Answering that question is central to the policy agenda to alleviate poverty among the poorest.

In the next section we begin with the rural urban divide and focus on how large are the differences in incomes between rural and urban areas and how much of this difference may be explained by education. In assessing the potential role of education in creating jobs the key variable is how the rate of return on human capital compares with that on physical capital. Human capital creates jobs indirectly by ensuring a more productive economy. If, and it will be argued this may well be the case, investment in human capital is a low return activity then an increasing mismatch between educated labour and the jobs for them will result. That is the problem on the demand side of the market. There are also potential problems on the supply side in that much education in Africa does not create human capital. Increasingly those working on education have focused not on the years students spend in school but on what they learn when they are there. These concerns lead into the discussion in section 4 on how the quality of education can be improved. In sections 5 and 6 we return to the links between the expansion of education and jobs. The final section considers how jobs for both the unskilled and skilled can be created and how educational policy needs to be changed to make the creation of jobs across the skill range match more closely the skill composition of the workforce.

5.2 The rural urban divide

There are two fundamentally different views as to how rural and urban incomes in Africa compare. One sees a segmented market with large differences in income available to labour in urban rather than rural areas. The labour market does not clear with urban unemployment, or a very low income informal sector, acting to equalise expected wages across the sectors. A second view recognises the extent of heterogeneity within both rural and urban labour markets and sees education as one, but only one, of the skills necessary to be more productive in urban than in rural areas.

The view that labour markets between rural and urban areas are segmented has played an important role in the analysis of how developed countries grow. When seeking to compare incomes across those sectors the gaps looked very large and clearly it appeared something was required to explain these gaps. In an interesting recent study of migration within Tanzania, Beegle et. al. (2011) find that rural-urban migration led to about a 30 per cent rise in per capita consumption appearing to

confirm the crucial role of understanding differences in labour market outcomes related to location. They are careful to point out that that this difference cannot be caused by the migration – if it were, why did not all migrate? There must be factors either limiting the gains from migration for some or raising their cost that led a selected group of individuals or households to migrate. It is the role that selection may play in labour market outcomes that is central to distinguishing two fundamentally different views of how labour markets work in developing countries. Is what we observe the result of segmentation or selection determined by unobserved heterogeneity? Not only is this question of importance for which theories are consistent with the data, it is also of great importance for policy makers.

Early tests of the segmented market thesis sought to show that wages for similar types of labour differed across sectors, by the size categories of firms, or by the profitability of firms. However, these tests are problematic for many reasons. Heckman early on pointed out that differences in wage or labour rates across individuals did not necessarily imply segmentation*; the Roy (1951) model of occupational sorting implies that treating any sector effect as causal misses the point that the occupation was chosen. Magnac (1991) provides a discussion and one of the first tests. The fact that formal workers earn more than informal ones does not imply that an informal worker who switched to formal employment would earn more. An alternative view to the widely cited Harris and Todaro (1970) explanation for what we observe is due to Lucas (2004) who developed a model in which the “unemployed” were learning about the application of their skills to urban job opportunities. In such a model, migration is not limited by the effects of unemployment on expected wages but by the differing times it takes heterogeneous individuals to learn about, and respond to, their differing abilities in urban markets.

How large are the differences between rural and urban incomes within SSA? In a recent study looking at the household surveys in Ghana and Tanzania, Owens, Sandefur, and Teal (2011) show that with controls for the education of the household head, gender, and household size, the gap in consumption per capita across households in rural and urban sectors was 40 per cent in Ghana and 22 per cent in Tanzania. In neither country was there any evidence this differential had changed over the period from 1988 to 2006 for Ghana and from 1991 to 2007 in Tanzania. The paper also attempts to measure incomes, as distinct from consumption, and with all the necessary caveats for the problems that exercise poses, the differences in income between rural and urban sectors is very much greater than the differences in consumption; 100 per cent in Ghana and 80 per cent in Tanzania. It needs to be noted that these differentials are with controls for education and household size which are assumed to be the major observables which account for differences in incomes across sectors.

Thus, the evidence points to both consumption and incomes being higher in urban than in rural areas, the latter quite substantially. The patterns of structural change which have characterized almost all economies which have made the transition from low to higher incomes have involved a process of increased urbanization. In understanding the role of education in increasing higher income jobs, the link between education and urbanization is central.

In this context, it matters a lot as to how far the differences in consumption and incomes we observe are due to segmented markets* which prevent rural workers from moving to jobs in the urban sector and how much is due to a process of sorting by

which those best able to work in urban areas end up being employed there. The analysis we have presented for differences across urban and rural sectors in Ghana and Tanzania controls for education; so simply the level of education a household has achieved does not explain these differences in consumption and incomes.

Just how large is the difference in incomes across sectors is due to sector-specific factors and how much of the difference is due to education? The above analysis does not answer that question, as if the more educated migrate from rural to urban areas then some aspects of the return to education is captured in the urban “effect” which the data shows to be large. Further, it is possible that urban based activities are not only more productive but experience more rapid rates of productivity growth and a key mechanism for that productivity growth is the higher level of skilled labour used in urban based activities. The more rapid rates of productivity growth will turn up in the data in other measures of human capital than in education. They will appear as more steeply increasing earning profiles with market experience and tenure in a job, exactly the pattern that will characterise high, rather than low, quality jobs.

Establishing how far incomes differ across rural and urban areas is difficult as measured incomes within rural areas include the incomes from land and incomes in urban areas, for those not in wage employment, which is the majority, include the return from physical capital. Incomes to labour in all sectors clearly include the return from human capital. Establishing how much of any income difference can be imputed to education is an important aspect of a research agenda for work on education in poor economies where the majority work in agriculture.

Currently work has focused on the “return” to this investment without a focus on the jobs available for the educated. This literature has several limitations. One discussed by Heckman, Lochner, and Todd (2009) in a recent review of this literature points out that the coefficient on education in a semi logarithmic earnings function does not, in general, measure the variable in which we are interested, which is the rate of return on investment in education. A second is that education, taken in isolation, is not a very important determinant of earnings. Mortensen (2005, p. 1) writes: “Although hundreds if not thousands of empirical studies that estimate so-called human capital wage equations verify that worker characteristics that one could view as indicators of labour productivity are positively related to wages earned, the theory is woefully incomplete in its explanatory power. Observable worker characteristics that are supposed to account for productivity differences typically explain no more than 30 per cent of the variation in compensation across workers in these studies”.

The labour markets on which the work of both Heckman, Lochner, and Todd (2009) and Mortensen (2005) is based is for developed market economies. In such economies, virtually all work is in urban areas and education is typically compulsory for all aged less than 15 or 16. For poor countries, neither of these conditions applies so the shape of the earnings function for low levels of education becomes crucial. In other words, we need to focus not on the average return to education but how that return differs across the range of educational outcomes. Further, the aspects of how jobs differ in urban areas relative to rural ones in other dimensions than the level of education needs to be examined. In summary, how education impacts on the incomes and consumption of the poor requires a consideration of both where, and what sort of, jobs are being created.

5.3 Rates of return on human and physical capital within sectors and across sectors

What determines the creation of jobs which require more education, i.e., which are more skilled? The answer is, in part, the rates of investment in physical capital, in part, the type of investment being carried out and, in part, rates of productivity increases. These productivity rises may be due to the creation or adoption of more efficient technologies; they may be due to workers learning to use an existing technology more efficiently. The common factor across all these dimensions of capital, and its productivity, is an increase in the size and complexity of enterprises.

In understanding the mismatch between the increase in the supply of education and the failure to create sufficient jobs for the educated we need to consider whether the rates of investment in physical capital have been too low or whether the increase in the supply of education has not resulted in a commensurate rise in human capital. Both factors may, of course, be at work at the same time and indeed they may be linked as poor quality education may make investment in certain types of capital too expensive to be worth undertaking.

Low rates of investment in physical and financial capital in sub-Saharan Africa present a puzzle. There is a common finding across both rural and urban sectors in SSA that returns to enterprise capital are very high. Why, if the returns on investment are so high, does not more investment occur? Economists have not been short of ideas for answering that question and the answers they have advanced have differed by sector. In the work on the rural sector, several mechanisms have been put forward to explain observed patterns of agricultural technology adoption. Processes of social learning have been much studied (Conley and Udry 2010 and Foster and Rosenzweig 1995). If social learning is sufficiently important, low-adoption equilibria may persist in spite of potentially high returns. Alternative theories include credit and supply-side constraints (Moser and Barrett 2006). In Kenya, Duflo and co-authors find evidence consistent with the view that time inconsistency in farmers' preferences causes inefficient adoption decisions. Another explanation is in terms of the role of treatment effect (Suri 2011). Using a panel dataset of Kenyan maize farmers, Suri estimates a model that allows for heterogeneous returns to fertilizer. Suri's econometric method allows her to estimate a mean return to fertilizer use for four subgroups, which are defined by their adoption histories in each of the four waves of her data. There is a non-monotonic relationship between the adoption rates and expected returns of these subgroups in her data. Suri argues that transaction costs are particularly high where returns are highest.

The focus of the work on firms has been rather different. Research on firms in developed countries, specifically the U.S. and the UK, argues that aggregate productivity growth is driven primarily by a churning process in which less efficient firms exit and more efficient ones enter the market (Foster et. al. 2001 and Disney et. al. 2003). Similar evidence of 'survival of the fittest' has been reported by Liu (1993) in Chile and Liu and Tybout (1996) in Colombia and Chile. Söderbom, Teal, and Harding (2006) provide some evidence that this process may be at work for larger firms but there is no evidence it is for smaller ones. While survival of the fittest is likely in competitive economies where instruments (e.g. financial ones) designed to manage shocks are available, the link between efficiency and firm churning may well be weaker in environments without these characteristics. It is possible, for instance, that in Africa, because of limited availability of smoothing mechanisms, a temporary negative

demand shock may force efficient and economically sound firms to close down. If this is so, company churning will be associated with a welfare loss and result in modest or no aggregate productivity gains.

Whatever their source, the failure within most of sub-Saharan Africa to create a substantial high productivity sector within either the rural or the urban sectors has major implications for the return to education. In sub-Saharan Africa the evidence is that the return to physical capital substantially exceeds the return to education (which is not the same necessarily as the return to human capital) and that the return to that education, even for wage earners, is highly convex (Bigsten et. al. 2000).

The convexity that has been documented in these African countries implies that the return to education increases with the level of education, at least over some of its range. This can create a process by which the incentives families have to invest in education is not the returns from lower levels but the fact that investment in these lower levels creates the “option” of being able to proceed to higher levels.

5.4 Improving the supply of human capital

In the previous section we have made a distinction between the supply of human capital and that of education.

The convexity of earnings to which we have referred is with respect to education. As has been widely documented, the quality of education can differ very substantially both across schools within a country and across countries. In the last section, we outlined how a process by which this convexity can, if combined with low rates of investment in physical capital, lead to a pattern by which there is a gross mismatch between an educated labour force, and the incentives to acquire education, and jobs for them. However, that may only be part of the problem. It may well be the case that the education is not producing human capital in the sense of cognitive skills of value in the workplace.

Years of education on which all the work surveyed in the last section is based is not the same as human capital. In this section we review some of the evidence as to how education and human capital creation can be more closely linked.

Many interventions have been implemented in both developed and developing countries with the goal of improving education outcomes. While some interventions have been more successful than others, several similar interventions have been successful in some settings and not in others. Understanding which interventions work and when is important for allocating limited resources within the education sector. This section summarizes the findings regarding the impacts of education interventions that have been evaluated in African countries and discusses the gaps in evidence that remain.

The appropriate policy intervention for improving education outcomes will necessarily depend on the reasons for the existing deficits in education, as well as, which aspects of education require improvement.

For example, interventions aimed at increasing enrolment may differ drastically from those aimed at improving school completion rates or test scores. Moreover, the reasons for low initial enrolments, for example, may differ between countries, within a country, and over time. The appropriate policy intervention will differ accordingly. Therefore, it is important to understand both the mechanisms underlying each intervention, as well as, the initial education circumstances in the setting where the evaluation is taking place when deciding whether to promote the adoption of a given intervention.

This section describes the major education interventions that have been evaluated in African countries, the mechanisms through which they operate, and their impacts.

We then characterize settings where the findings of each intervention may be extrapolated. We begin by providing an overview of the education decision-making process and characterizing the education production function.

We then present the main measures of education outcomes, discuss different types of interventions, their successes and failures, and conclude with a description of the gaps in knowledge that remain.

5.4.1 The decision to invest in education

Decisions regarding a child's education are largely made by adults in his/her household, though children may also exhibit some decision-making power. As children age, they generally gain more decision-making power regarding their education. The design of appropriate policy interventions should consider which household members make education investment decisions. Whoever makes the decision of how much to invest in education generally does so by comparing the costs to the expected benefits. As with all investments, the costs associated with education are immediate and certain while the benefits are risky and occur in the future. Moreover, the costs are generally incurred by a child's parent or guardian while the benefits accrue, in large part, to the child being educated.

Therefore, changing existing education decisions may involve changing either the costs or the benefits of education, or both. Education outcomes can also be changed without changing the direct costs of education or its benefits by changing the implicit costs of education through credit access, thus, enabling households to finance education expenditure.³⁰

In most countries, there are both explicit costs associated with education as well as opportunity costs. According to Tomasevski (2006), out of 46 Sub-Saharan Africa countries in 2006, 17 have implemented free primary education. Kenya and Uganda are two African countries currently rolling out free secondary education. In most countries, secondary and tertiary education is more costly than primary education.

³⁰ Education outcomes may also be changed by changing the person responsible for making education decisions. However, to our knowledge, no such intervention has been implemented and evaluated in Africa.

Even in countries with free primary and/or secondary education, there are often additional costs of education beyond school fees including the costs of books, supplies, uniforms, transport to and from school, and school meals. Many of these costs may be mandatory for school attendance. An additional cost of school attendance is the opportunity cost of a child's time. If a child works for pay, in a household business, on a family farm, or caring for siblings, their time is valuable and having the child attend school instead of completing these tasks may be costly. The household may be required to hire outside labour, increase the amount of work done by other household members, or decrease production or sales if the child were to attend school. Additionally, there may be non-pecuniary costs associated with school attendance including harassment, particularly for girls.

The primary benefits of education are those associated with improved labour market outcomes discussed in the previous sections. Moreover, a positive relationship between education and various health measures, including life expectancy, has been observed in many countries and over many time periods (Cutler and Lleras-Muney 2006). Additionally, intergenerational effects of education have been observed on education and health outcomes of subsequent generations (Oreopoulos et. al. 2006, Currie and Moretti 2003, and Glewwe 1999). Finally, there are additional social benefits from education that extend beyond the individual including reduced crime rates (Lochner 2010) and increases in civic participation (Dee 2004). However, the benefits of education, especially those in the labour market, will differ depending on the quality of education, characteristics of the economy, and between rural and urban sectors.

Education interventions can affect the supply side of education and/or the demand size of education. By influencing the costs of schooling for households, a policy can affect the demand for education. The quality of education can also be improved by supply-side interventions increasing the number of schools and teachers for example. These interventions may also improve schooling quality and, therefore, increase the benefits of school attendance, also affecting the demand for education.

Though all education interventions have the aim of improving education outcomes, there are many different dimensions of education that an intervention may affect and many different ways of measuring each dimension. The next section describes these different dimensions and their measurements.

5.4.2 Education outcomes

Several different education outcomes are of interest to policy makers. A primary measure of the level of education in a country or a region is the level of participation at different levels of education (primary, secondary, and tertiary). The gross enrolment rate summarizes such participation as the number of individuals who are enrolled in a given level of education by the number of individuals of the appropriate age for that given level of education. The net enrolment rate restricts the number of individuals enrolled to those in the appropriate age category. Both the gross and net enrolment rates are important measures for assessing access to education and the difference between the two measures is evidence of delayed entry to schooling, class repetition, and interruptions in schooling. Moreover, enrolment rates can be calculated for sub-groups of the population, including by gender, which are often of interest to policy makers.

Age at entry to primary school is another measure of school participation that may be affected by policy interventions. Delayed school entry can have harmful negative consequences including increasing the likelihood of later dropout and lower levels of educational attainment (Bommier and Lambert 2000).

Another measure of school participation is school attendance. Though school attendance is less often measured, it is a more accurate measure of school participation if measured well. A student may be enrolled in school if there are no enrolment costs or if those costs are sufficiently low. However, they may be enrolled but not attend school or subsequently have dropped out. Such changes would be captured in a measure of school attendance but the child would be considered to be participating in education using a measure of student enrolment.

Once students are enrolled and attending school, one can measure their progression through school by investigating class repetition, dropout rates, completion rates, and transition rates to higher levels of education. These measures of student progression assess learning success. Learning can also be measured using grades and test scores; both those that are comparable across countries, such as, the Programme for International Student Assessment (PISA) scores and West African Senior School Certificate Examination (WASSCE) scores, as well as, tests created exclusively for a policy evaluation.

5.4.3 Education interventions

Most of the education interventions that have been evaluated in Africa are at the primary school level. This section summarizes the findings from rigorous evaluations conducted in Africa, as well as, a number of interventions that have been conducted in other developing countries which may be relevant in Africa. Each intervention is described in terms of how it affects the costs and/or benefits of education discussed above and in what type of circumstances it is likely to be successful.

5.4.4 Fees, Transfers and Scholarships

Conditional cash transfer (CCT) programmes have been implemented and evaluated in many countries, most prominently in Latin America, and have been relatively successful at improving school participation. These programmes transfer funds to individuals or households conditional on a specified set of actions. For example, CCT programmes are often conditioned on household members' school enrolment or attendance.

The CCT programme *Progresa/Oportunidades* in Mexico provides an average monthly payment of approximately 20 percent of the value of monthly consumption expenditure prior to the initiation of the program conditional on regular school attendance and visits to health care centres to beneficiary households in rural Mexico. Skoufias (2005) summarizes the results of various research papers investigating the impacts of *Progresa*. In this chapter, we focus on the education impacts of the programme though it should be noted that the programme was also successful at improving other measures of household welfare.

After three years of the programme, poor children in rural areas of Mexico where *Progresa* was operating were more likely to enrol in school; particularly at the secondary school level. The total effect of the programme on grade attainment is an increase of 0.66 years of schooling by grade 9; an increase in educational attainment of 10 percent.

Schultz (2000) calculates the cost effectiveness of the programme by comparing the expected program payments to the expected increase in adult productivity of the students who would benefit from a permanently established *Progresa* programme. He uses current urban wage differentials to approximate the expected return to programme beneficiaries from their schooling in terms of future percentage increases in their wages and finds an internal rate of return to the educational transfers provided by the programme of 8 percent per year in real terms (adjusted for inflation). However, as noted previously, the urban wage may not be the appropriate expected return to schooling for rural students.

The evaluations of other conditional cash transfer programmes in Latin America have yielded similar results. Maluccio (2003) finds that the *Red de Protección Social* programme, a CCT programme in rural Nicaragua, had a significant effect on schooling matriculation and enrolment and led to a substantial reduction in child labour among school-age children during its first year of operation. Similarly, Schady and Araujo (2006) find that a conditional cash transfer program, *Bono de Desarrollo Humano*, in Ecuador significantly increased school enrolment. Glewwe and Olinto (2004) find that the CCT programme *Programa de Asignación Familiar II* in Honduras increased enrolment rates by 1-2 percentage points, reduced the dropout rate by 2-3 percentage points, increased attendance (conditional on enrolment) by approximately 0.8 days per month, and increased annual grade promotion rates by 2-4 percentage points.

Glewwe and Kassouf (2008) evaluate the impact of Brazil's CCT programme, *Bolsa Escola/Bolsa Família*. They find that the programme increased enrolment in Brazil by approximately 5.5 percent in grades 1-4 and 6.5 percent in grades 5-8. They find that the programme decreased dropout rates by approximately 0.5 percentage points for children in grades 1-4 and 0.4 percentage points for children in grades 5-8. The programme also raised grade promotion rates by approximately 0.9 percentage points for children in grades 1-4 and 0.3 percentage points for children in grades 5-8. However, the authors find that based on the estimated programme enrolment impacts, the likely benefits in terms of increased wages may not exceed the costs of the programme itself.

The evidence from the evaluations of conditional cash transfer programs in Latin America suggests that the programmes are successful at improving school participation and progression. However, their impacts on future wages and their cost-effectiveness are still debatable. Moreover, their appropriateness for adoption in Africa is not yet clear.

Kakwani et. al. (2005) conduct an ex-ante evaluation of the impacts of a CCT programme on poverty and school attendance in 15 Sub-Saharan African countries³¹

³¹ The 15 African countries included in the study are: Burundi, Burkina Faso, Côte d'Ivoire, Cameroon, Ethiopia, Ghana, Guinea, Gambia, Kenya, Madagascar, Mozambique, Malawi, Nigeria, Uganda, and Zambia. The choice of the 15 selected countries was determined by the availability of household survey data.

and explore different budget scenarios and targeting strategies. The authors find that in each of the sampled countries, rural poverty is far greater than urban poverty, and conclude that any CCT programme to be implemented in the African countries in the sample should be established in rural areas. The authors also make three policy recommendations based on their findings. The first is that in order for any CCT programme to significantly reduce poverty, it will need to be sizeable; in the order of 2 to 8 percent of the GDP of the country in question. Secondly, the authors state that an increase in income, by itself, will not be sufficient to significantly increase school attendance. Therefore, the authors argue that the transfer be conditional on some education or other human capital requirement. Finally, given the extent of poverty in the countries in the analysis, the authors suggest a broad targeting scheme, such as a geographical one, so that the programmes avoid incurring the high administrative costs that are common in highly targeted CCT programmes.

The main limitation of this study is that the authors are unable to investigate the availability and quality of schooling facilities due to lack of data, and, therefore, assume that all supply-side constraints have been resolved. This is not the case in reality. Therefore, their results and policy recommendations are based on the assumption of the availability of quality schooling to all potential beneficiaries of the programmes. As this is not the case, the likely impacts of the programmes are lower than those estimated in the paper.

Schubert and Slater (2006) also discuss the possibility of the implementation of conditional cash transfer programmes in Africa and argue that important contextual differences between Africa and Latin America, in the quality and quantity of service provision, the capacity to implement conditionality, sociocultural, ethnic and political contexts, and, potentially, the cost-benefit ratio of conditionality, may make the introduction of CCTs in Africa inappropriate.

Conditional cash transfer programmes are appropriate when the supply of quality education is available to all potential beneficiaries. This is not the case in many parts of Africa. Any successful CCT programme in Africa would need to be combined with other interventions in the education sector to improve the quality and quantity of education. Moreover, CCT programmes can be quite costly to implement, in part, because they provide a subsidy for school attendance or enrolment to many households who would have sent their child to school in the absence of the transfer.

The CCT programmes implemented in Latin America all provide transfers in cash to households. Transfers of food to individuals or households conditional on school attendance have been implemented and evaluated in Africa. The World Food Programme commissioned two evaluations of its school feeding programmes; one in Uganda and one in Burkina Faso. In Uganda, two alternative food-for-education (FFE) programmes were evaluated; one in-school meals programme and one take-home rations programme. Both interventions were equal in the size and composition of the food transfer. The in-school meals programme (SFP) provided two meals to each student in attendance during the school day. Therefore, it was, by definition, conditional on school attendance. The take-home rations (THR) intervention was conditional on a minimum level of school attendance (85 percent of days in the previous month) and was given to the child once a month as a dry ration.

Alderman et. al. (2012) find positive impacts of both FFE programmes on school participation. The results show positive impacts of the SFP programme on primary school enrolment when the analysis is restricted to children who were not enrolled before the introduction of the FFE programmes. Also, on the basis of the results from data collected during unannounced attendance visits, the authors find significant positive impacts of both in-school meals and take-home rations on morning and afternoon attendance. The results also show a weakly significant impact of both FFE programmes on age at entry to primary school and a reduction in grade repetition from the SFP programme for boys. Finally, the authors find no impact of either programme on progression to secondary school. However, children in grade 6 or 7 in SFP schools in 2005 were significantly more likely to remain in primary school as of 2007. This suggests that school meals may have the unintended effect of increasing the time taken to complete primary school.

Adelman et. al. (2008) investigate the impacts of the two FFE programmes in Uganda on learning achievement and cognitive development. The results show that neither programme had significant average impacts on the math and literacy test scores of 6-14 year olds. However, the THR programme did improve math scores of 11-14 year olds by 16.7 points. Both the SFP and THR programmes had large significant impacts on math scores of 11-14 year olds who had delayed school entry. On the literacy exam, SFP weakly increased test scores of 11-14 year olds by 6.4 points. For 6-10 year olds, literacy scores actually fell as a result of participating in the THR programme. However, access to the THR programme also caused significant improvements in Primary Leaving Exam (PLE) scores. On cognitive development, both programmes improved cognitive function in terms of ability to manipulate concepts. Girls in the THR programme also demonstrated improvements in short term memory and (weakly) in reasoning and perceptive ability compared to girls in the control group.

Kazianga et. al. (2012) evaluate two food-for-education programmes in rural Burkina Faso; one school meals programme where students were provided with lunch each school day and a take-home rations programme which provided girls with 10 kg of cereal flour each month, conditional on a 90% attendance rate. After the programme ran for one academic year, both programmes increased enrolment by 3–5 percentage points. Mathematics scores improved for girls in both school meals and THR villages. Conditional on enrolment, the interventions caused school attendance to decrease, but this was primarily driven by lower attendance among new enrollees. The interventions did not, on average, change child labour participation.

These two studies demonstrate that food-for-education programmes can have positive impacts on school participation, especially if initial levels of enrolment are low, as they were in Burkina Faso. However, without the availability of quality education, these school participation improvements will not improve learning outcomes and progression to higher levels of schooling.

An alternative in-kind transfer to food is the provision of uniforms. Evans et. al. (2009) evaluate the impact of an educational intervention in Kenya where a non-governmental organization distributed school uniforms to children in poor communities. The NGO used a lottery to determine which children received uniforms. The authors use winning the lottery as an instrumental variable to identify the impact of receiving a uniform. They find that the provision of a school uniform reduces school absenteeism by 44 percent for the average student and by 62 percent for students who did not initially own

a uniform. The programme also raised test scores for uniform recipients by 0.25 standard deviations in the first year of the programme.

Another method of providing households with transfers conditional on their children's school participation is by reducing or eliminating school fees. Many countries in Africa have recently introduced free primary education (FPE). However, it is extremely difficult to evaluate the impact of such a change as it has been implemented country-wide. Riddell (2003) discusses the impacts of the introduction of free primary education in Kenya, Malawi, Tanzania, Uganda, and Zambia. She states that gross and net enrolment rates increased in all the countries under study following the introduction of free primary education, except for Zambia. However, though this evidence is suggestive of a link between FPE and enrolment, it does not provide causal evidence. Riddell also describes several problems in the provision of primary education that remain, some of which she argues have been created or exacerbated by FPE policies. She states that unless education quality is improved, high enrolment rates will not necessarily lead to an educated population.

Deininger (2003) investigates the impacts of Uganda's "Universal Primary Education" programme which was introduced in 1997 and eliminated the cost of primary schooling for up to four children per household of which at least two had to be girls. Deininger compares primary to secondary education to control, at least to some extent, for common macro-economic factors. He finds that the programme was associated with a dramatic increase in primary school attendance, that inequalities in attendance related to gender, income, and region were substantially reduced, and that school fees paid by parents decreased at the primary but not at the secondary level. However, the general decline in the quality of education suggests that, in order to lead to sustained improvements in attendance and to transform these into higher levels of human capital, the policy needs to be complemented by improvements in school quality and accessibility of secondary education.

Muyanga et. al. (2010) evaluate the introduction of free primary education in Kenya in January 2003 using propensity score matching and panel data. The authors find that while primary and secondary school enrolment rates increased, grade progression in primary schools has declined, suggesting the declining quality of primary education as a result of congestion, lack of teachers, and insufficient primary school infrastructure due to increased enrolments.

Though free primary school is now available in many African countries, the provision of free secondary schooling is limited to only a few. Given the expense of providing free secondary schooling, other policies for improving school participation at the secondary level have been implemented. Kremer et. al. (2009) investigate the impacts of a merit scholarship program for adolescent girls in Kenya. The scholarship programme provided grade 6 girls who scored well on academic exams with an award for their school fees and supplies for the next two academic years, through the end of primary school. The authors find that girls eligible for the scholarship showed significant gains in academic exam scores and that these gains persisted after the end of the competition. The authors also find evidence of positive spillovers; boys, who were ineligible for the awards, also showed sizeable average test score improvements, as did girls with low initial scores, who were unlikely to win the scholarships. Both student and teacher school attendance increased in the programme schools.

5.4.5 School Availability and Inputs

The availability of schooling and schooling inputs influence both the costs of schooling as well as its benefits. Lack of access to schooling is generally a greater concern in rural areas compared to urban ones. In some rural settings, the nearest school may be a distance away. If a child is to attend, he/she would be forced to travel long distances to do so. This can be costly both in terms of the direct costs of transport, as well as the opportunity cost associated with the time the child spends traveling. Moreover, if the nearest school is sufficiently far away, students may be required to board at the school, with a relative, or with another household nearby. Boarding fees can be prohibitively costly for poor households. In urban settings, schools may be nearby but overcrowded and, therefore, the benefits of attendance may be low.

In most settings, primary schools are more accessible, especially in rural areas, than secondary schools and tertiary education institutions. Moreover, if schooling is segregated by gender or religion, even if a school is located nearby, it may not be accessible to all children.

Duflo (2001) investigates the impacts of a large school construction program in Indonesia on schooling and labour market outcomes and shows that each primary school constructed per 1,000 children led to an average increase of 0.12 to 0.19 years of education, as well as a 1.5 to 2.7 percent increase in wages. To our knowledge, no evaluation of school construction has taken place in Africa. Once schools are accessible, they require resources enabling them to provide quality education to their students and to incentivize students, or their parents or guardians who make their education decisions, to attend.

Schools in many parts of Africa are lacking resources and several interventions aimed at addressing this deficit have been implemented and evaluated. These interventions aim at improving education quality. Glewwe et. al. (2009) investigate the randomized provision of textbooks in rural primary schools in Kenya and finds that providing textbooks did not raise average test scores. Textbooks did increase the scores of the initially best performing students but had little effect on other students' scores. The authors argue that as textbooks are written in English, most students' third language, many students could not use them effectively.

Glewwe et. al. (2004) also find no improvement of test scores from another school input intervention in rural Kenya. The authors evaluate a randomized control trial providing schools with flip charts. Initially, flip charts and other visual aids were rare in schools in the study areas, and less than one-third of the sampled schools had any flip charts before the study. The authors find no impact of changes in test scores due to the introduction of flip charts.

5.4.6 Teachers

Given the findings above, that, in many evaluations, schooling inputs alone do not significantly increase educational achievement, it is important to consider the cause. One possible explanation is that the inputs are not used effectively by students and/or teachers. In this section, we discuss the role teachers and school management play in student education outcomes and mechanisms for improving their performance.

Teachers may perform poorly for two broad reasons; due to lack of skills and/or due to misaligned or poor incentives. Teacher absenteeism is often cited as a concern in many African countries (Chaudhury et. al. 2006 and Glewwe et. al. 2010). As such, several interventions have introduced changes to teacher incentives and monitoring in order to improve their attendance, and, therefore, student learning.

Many African countries have recently launched large contract teacher recruitment programmes, whereby teachers are hired not as civil servants but using fixed-term contracts, typically with lower salaries, less training, and more community-level monitoring than regular teachers. Their hiring increases the supply of teachers and, all other things equal, reduces the student-teacher ratio. Moreover, as they are hired on fixed-term contracts, their effort and attendance is expected to be higher than regular teachers whose positions are generally permanent. However, if there is no monitoring of their performance or their re-hiring is automatic, their incentives will be no different from regular teachers. Finally, since contract teachers are usually less educated and trained than typical teachers, teaching quality may be lowered, worsening student outcomes.

Bourdon et. al. (2009) investigate the impacts of hiring contract teachers in Niger, Togo, and Mali. The authors find that, overall, contract teachers are better at teaching students with learning difficulties than more advanced children, thus, reducing inequalities in student outcomes. They find differential effects by country and argue that they are due to differential programme characteristics and their implementation. The authors find that the effects are positive in Mali, somewhat mixed in Togo, and negative in Niger. They argue that in Mali and, to some extent, in Togo, the contract teacher system was more closely linked to local communities which may have improved monitoring and led to the more effective hiring of contract teachers. In Niger, the system was changed centrally with all contract teachers being public employees and the programme was implemented very quickly which may have added to the programme's poor performance.

Duflo et. al. (2012) evaluate a program in Western Kenya that enabled Parent-Teacher Associations (PTAs) to hire novice teachers on short-term contracts. They show that these contract teachers were absent one day per week less and their students learned more than civil service teachers. Moreover, the authors are able to attribute the improvements in student test scores to the hiring of the contract teachers alone and not the accompanying reduction in class size resulting from the hiring of an extra teacher.

Bold et. al. (2012) investigate the scaling-up of a contract teacher intervention in Kenya that was very similar to that of Duflo et. al. (2012) described above. The intervention was implemented in all Kenyan provinces in parallel by a non-governmental organization and the Kenyan government. The authors find large differences in impacts between the NGO-implemented programme and the government-implemented programme. While the NGO-implemented programme had a significant positive effect on math and English scores of 0.19 standard deviations, the government-implemented programme had no effect on test scores. The authors discuss the political economy factors that may explain the differences in impacts. However, their results are an important reminder to policy makers that results from small scale interventions may not be replicated when the programme is expanded or run by a different organization.

Glewwe et. al. (2010) evaluate a randomized intervention that provided primary school teachers in rural Kenya with incentives based on student test performance. Students in

schools operating the programme had higher test scores, significantly so on at least some exams, during the duration of the programme. The authors also investigate the mechanisms generating the improvements in student performance and find that teacher attendance did not improve, homework assignment did not increase, and pedagogy did not change. However, teachers did conduct more test preparation sessions. Moreover, although the programme had positive impacts on student performance during the duration of the programme, the improvements did not remain after the programme ended.

An integral feature of poor quality education in many parts of Africa remains the severe teacher problems, including the number of trained teachers, their attendance, and their teaching when they are in attendance. Several ongoing evaluations are investigating methods of improving teachers' behaviour and teaching including ones investigating school management, empowering parent-teacher associations, and decentralization.

5.4.7 Health Interventions

One explanation for poor student attendance and performance is poor health and nutritional status. Firstly, illness may directly impact student attendance. Moreover, poor nutritional status may lead to lower cognitive function which can have detrimental effects on learning (Pollitt 1995). Therefore, health interventions can have a positive impact on education outcomes in addition to their direct impacts on health.

Field et. al. (2009) evaluate the impact of reductions in iodine deficiency disorders from intensive iodine supplementation in Tanzania on schooling. The authors find a large effect of in utero iodine on cognition and human capital with treated children attaining an estimated 0.35-0.56 years of additional schooling relative to siblings and older and younger peers.

Miguel and Kremer (2004) evaluate a health intervention in Kenya in which entire schools were randomly treated with deworming drugs³². The authors find that the programme reduced school absenteeism by one-quarter in treated schools. Deworming also substantially improved health and school participation among untreated children in both treatment schools and neighbouring schools. The authors find that these externalities are large enough to justify fully subsidizing the treatment. However, they do not find evidence of any improvement in test scores due to the treatment.

5.4.8 Other Education Interventions

The composition of peers both within a classroom and outside of school have been found to have important impacts on education outcomes in both developed and developing countries. Tracking students is one method of changing the composition of peers in order to improve student outcomes. Duflo et. al. (2011) find that the direct effect of high achieving peers is positive in Kenyan primary schools. However, tracking benefited lower-achieving pupils indirectly by allowing teachers to teach to their level.

Another relatively inexpensive intervention is an information intervention informing students of the returns to education. When perceived returns by students are incorrect,

³² Girls under thirteen years old and all boys in the treatment schools were assigned to receive the treatment.

they may over- or under-invest in education. Jensen (2010) shows that perceived returns to secondary school among eighth-grade boys in the Dominican Republic are extremely low, despite high measured returns. He evaluates an intervention where students at randomly selected schools were given information on the higher measured returns. These students completed, on average, 0.20–0.35 more years of school over the next four years than those who did not receive the information.

Nguyen (2008) investigates two alternative information interventions regarding returns to education in Madagascar; solely providing information compared to a role-model sharing his/her success story, and an intervention combining both. She finds that providing the information alone improved average test scores by 0.2 standard deviations. Student attendance also increased by 3.5 percentage points compared to control schools. The introduction of a role model from poor background had a larger impact on poor children's test scores than seeing a role model from a rich background. However, the combination of a role model with information led to smaller treatment effects than the information treatment alone.

5.4.9 Evidence Gaps

Though many education interventions have been implemented and evaluated in Africa, serious challenges remain. Quality education is still lacking and many educated youth do not have the skills required for highly productive jobs. Much of the evidence regarding education interventions in Africa, as in most developing countries, is at the primary school level. However, the returns to primary education are generally found to be quite low. Investments in primary education create the “option” of being able to proceed to higher levels of education. Therefore, it is important that researchers begin investigating the accessibility of higher levels of education and improving education at the secondary and tertiary level, as well as the transition of educated youth into the labour market.

Moreover, understanding the mechanisms through which interventions operate is extremely important to enable policy makers to extrapolate their results to other contexts. Some existing evaluations do this better than others. While many education evaluations have taken place in Kenya, more research needs to be conducted in the rest of sub-Saharan Africa, where the context may be quite different.

5.5 Jobs across the size spectrum of enterprises and skills

The previous section documented the very wide range of interventions that have been introduced and evaluated in schools in Africa. All have as their objective establishing the most effective way of increasing the quality of education; that is, of turning education into human capital.

As we have already noted, there is much evidence that while the quantity of education has increased its quality has fallen.

What has been the effect of this rapid rise in the supply of education? Has its price fallen either because the supply has increased faster than the demand or because its quality has fallen? These are clearly vital questions for policy makers concerned with how best to expand the provision of education in Africa in a way that increases the number of young people in better jobs.

A rather striking fact about recent labour market developments in developed countries is that as the supply of educated labour has increased its price has not fallen but in many countries may well have increased – for those in employment. This is not a new fact. It was first noted for the US where the expansion of college education led to an increase in the return to that education. So what can explain such a fact? How can it be true that as we educate more young people the price that their skills command can increase? How can this be true when young people feel there are no jobs for their skills?

Acemoglu (1999) builds a model which suggests that when the supply of skills increases, the incentives of firms to create more skilled jobs also increase.

Why? The intuition of the model is that if both the productivity differential between skilled and unskilled workers and the share of the workforce that is skilled are sufficiently low

However, as both dimensions of skills increase, firms may find it more profitable to create higher quality jobs and the economy will flip to a new equilibrium with two classes of firms. In other words, in moving between equilibria the wages of skilled workers will rise, those of unskilled workers will fall, and their unemployment rate will increase. This model is of relevance to any attempt to understand how expanding education may link to the process of firm formation. It describes a process where job creation is high-jacked for the skilled.

The framework provided by the Acemoglu model gives insights into which types of jobs will be created and where. In stylised terms, the process that creates high skilled jobs will be linked to a process of lowering demand for the unskilled, who will need to take jobs which not only pay less but which may face falling wages. In poor countries, with rapid growth in the labour supply, the squeeze on “jobs for the unskilled” will operate on the supply margin as well as the demand.

What will be the consequences of this squeeze on “jobs for the unskilled”? The answer to that will depend on two aspects of the market. The first is the outside options open to unskilled labour.

The second is the degree of integration of the capital market. If the outside options are relatively high, the result will be high levels of open unemployment. If they are very low then there will be a surge in low paid unskilled jobs. If capital markets are fractured so the price of capital is highly heterogeneous, the result will be a wide range of small scale enterprises, some run as own self-employed, some being firms of very small scale. These firms while small will have very different capital labour ratios reflecting the heterogeneity in the capital market.

Size will be highly correlated with earnings partly because the relatively skilled end up working in larger more capital intensive enterprises, partly because size may be correlated with unobservables, and partly because as small scale enterprises expand, the incomes of the owner will include an increasing proportion of income from capital. In this framework, unemployment can be seen as employment in an enterprise of size unity in which the only income is from leisure.

While the notion that large firms are more skill intensive users may be true for most of the technological spectrum, it is not clear it applies to all. In particular, there are some

activities which are skill intensive which have traditionally been carried out in smaller scale enterprises – lawyers and accountants for example - and activities in which new technology may be making it possible for enterprises to be efficient at a small scale.

5.6 Educational levels in the labour force of sub-Saharan Africa

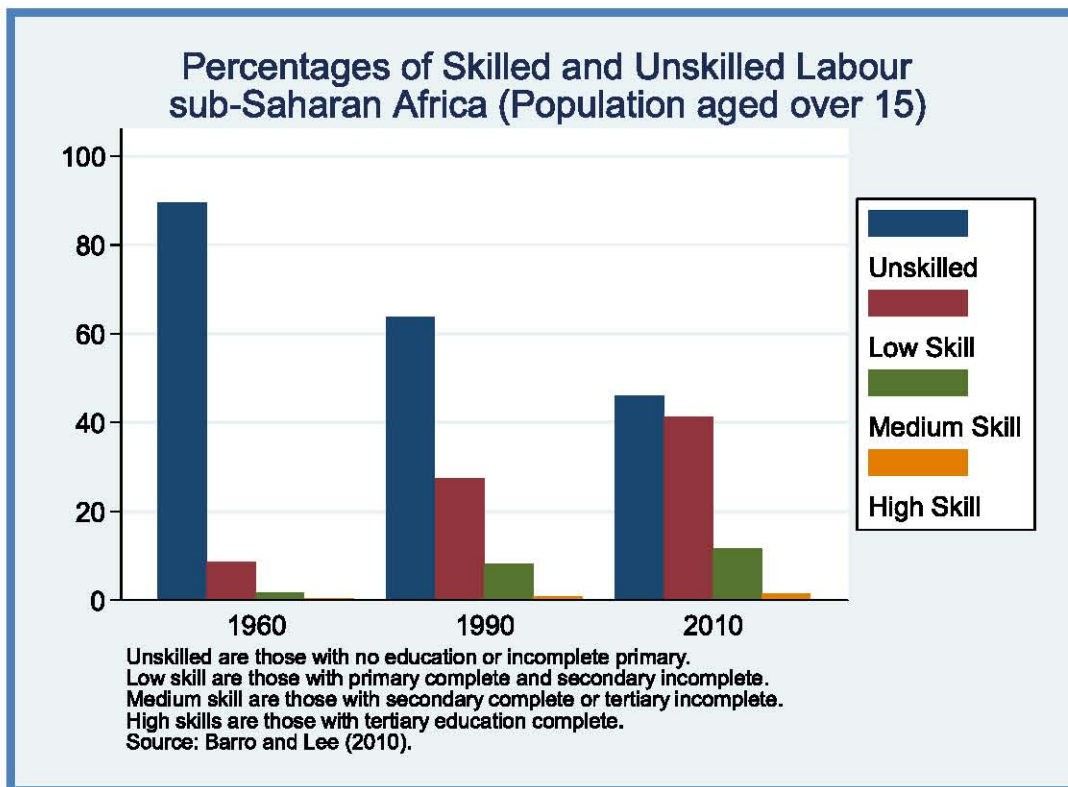
The evidence presented in Section 4 focused on how the supply of quality education can be increased. In section 5 we sketched how the demand for that education may change depending on the type of skills demanded in an economy. Any policy focused on the poor will need to focus on the relatively unskilled as it is the demand for their labour, and the price at which it is demanded, that is the key to increasing the incomes of the poor. In this Section we present some evidence as to the relative importance of skills in the labour force in SSA.

As the evidence presented in Section 4 showed much education does not impart skills. It is also the case that, particularly for the poor, some of the most valuable aspects of skills may not be imparted by attending school. In much of West Africa there is an extensive apprenticeship system operated by private firms. Work experience may also be an important aspect of acquiring skills. However for skills that enable workers to operate in firms of some sophistication the skills imparted by education are critical. It is also the case that the micro evidence suggests that the returns to education are much higher at higher levels and that completing secondary school is rapidly becoming the minimum necessary level of education to have the possibility of entering the formal sector. So while recognising that educational qualifications may be a very inaccurate measure of skills in this Section we document how the educational qualifications of the work force in SSA has changed over the last half century.

In Figure 5.1 we present the data from Barro and Lee (2010) for the percentages of skilled and unskilled in the population aged over 15 for 1960, 1990 and 2010. The Figure gives the averages across the SSA countries for which Barro and Lee (2010) data is available. The unskilled are defined as those with less than complete primary education, the low skill are defined as those with primary complete or with secondary incomplete, the medium skilled are those with secondary complete and some tertiary, while the high skill are those with tertiary education completed.

The Figure shows the dramatic transformation of educational qualifications in Africa's population over the last half century. In 1960, 90 per cent of the population were unskilled in that they had not completed primary school, by 2010 this had halved to 46 per cent. The low and medium skills which were less than 10 per cent of the population in 1960 were by 2010 over half. Higher skills, defined by completing university were negligible in 1960 and over 1 per cent in 2010. This last category may still seem very small but it is of importance for how Africa's skilled labour market is developing. Before turning to that we present in Figure 5.2 the implications of these percentage for the number of workers in the population aged 15-64 with the different skill levels.

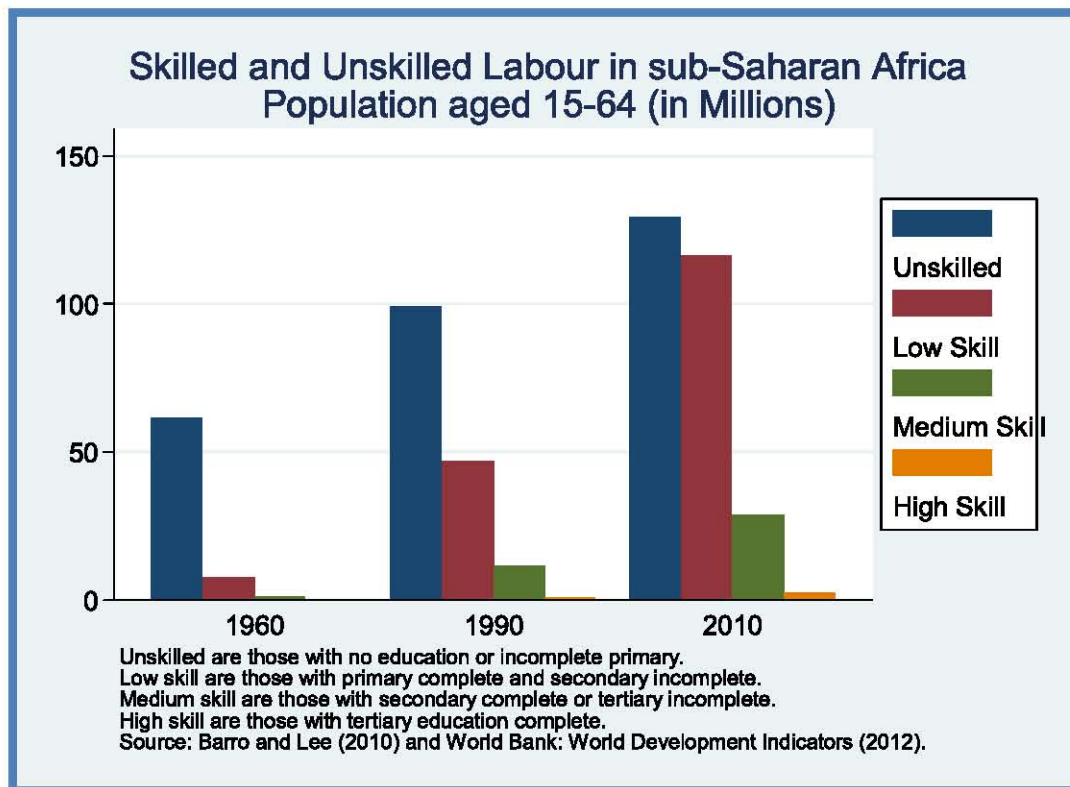
Figure 5.1 Percentage of Skilled and Unskilled Labour in SSA, 1960-2010



As Figure 5.2 shows while the percentage of the workforce who are unskilled has fallen by half such workers remain the most important part of the workforce although by 2010 this was only just true. By 2010 the low and medium skilled workers at 145 million were greater than the number of unskilled at 130 million. By 2010 there were some 2.5 million workers with university education. While clearly tiny as a percentage of the workforce their small numbers understate their importance for several reasons.

As is shown in Teal (2011) the tertiary educated are now the fastest growing part of the educated labour force. Further there has been an explosion of demand for education at the tertiary level in SSA. One interpretation of this pattern of demand is that the convexity of the earnings function shown in the micro labour force data is driving those with the resources to do so to acquire ever higher levels of education. A third reason why this element of the skilled labour force is important is that it is at the university level that workers have the potential to be able to enter the international market where the returns to the education are many times those available on the national market. A final reason for the possible importance of this relatively small part of the labour force is that it may have the skills complementary with a range of technology which may provide employment in the service sector.

Figure 5.2 Quantities of Skilled and Unskilled Labour in SSA, 1960-2010



It is though very clear from Figure 5.2 that the challenge facing African governments is to meet the expectations arising from the massive increase in low and medium level skills. Rises in enrolment rates at the secondary level imply that over the next decade the proportions of those we have termed medium skilled will rise rapidly and given continuing high population growth rates so will their absolute numbers. How can jobs for these lower skilled workers be created?

5.7 Creating jobs for the unskilled and the skilled: how can it be done?

Showing how the increases in education match with job creation is complex as while comparative data is available for the increases in education the same is not true for job creation. In this section we draw on a study of Ghana which does enable us to link educational levels to job outcomes, Nsowah-Nuamah, Teal and Awoonor-Williams (2012). Table 5.1 which is taken from that study shows male occupational choices across educational ranges drawing on three of the LSMS surveys in Ghana covering the years from 1991 to 2005. Table 5.2 shows the same breakdown for women. It is important not to assume Ghana is representative of other African countries. The evidence we have for small firm growth there is not available for other countries in SSA.

The three most striking changes shown in Tables 5.1 and 5.2 are the decline in the probability of employment in the public sector, the rise in the probability of employment in small firms and the increased probability of not having a job. These results apply across all educational levels and for both men and women. There is not an exact match

from the classification of skill levels used in the last section and how skills are classified in the Ghana study. However the level in Ghana which has expanded most rapidly and which is equivalent to the low skill category in the previous section is that of middle/junior school completion. How have the job prospects of these workers changed?

If we identify the urban informal sector with working in small firms or as being self-employed with no employees we see from Table 5.1 that if 1991/92 a male worker with junior high school completed would have had an 18 percentage points chance of being employed in the informal sector. By 2005/06 this percentage had risen to 30 percentage points, close to a doubling. For female workers (Table 5.2) there was actually a 6 percentage points decline in the probability of being in the urban informal sector from a much higher base of about 50 percentage points. However for women this decline in urban informality did not imply a rise in formality; there was a rise in both the probability of working in the rural sector and in not being employed at all.

How did the job chances change of the highest skill level in the Ghana data those with post- secondary education? We see from Table 5.1 that their probability of being in the urban informal sector increased from 8 percentage points to 26 percentage points, only just below that of those with junior high school. Whereas in 1991/92 male workers with this level of education would have had a 72 percentage points chance of being in the public sector by 2005/06 this had declined to 42 percentage points. As Table 5.2 shows for this skill level the patterns were similar for women.

The implication is that for the Ghana labour market the prospects of urban formal jobs have collapsed for all educational levels. The rise in urban informality is consistent with the rise, again across all educational levels, in being without a job as the incomes available from such jobs are so low a to be below reservation incomes.

Why then are there plenty of low paid jobs both in agriculture and the urban informal sector and so few better paying ones particularly for the young? Economies in the last thirty years have become increasingly open to trade – a process usually summarised as increasing globalisation. That has meant that jobs and the skills needed to get the jobs are closely linked to how successful an economy is in exporting.

While export jobs are available in both services – tourism, IT, finance – and in manufacturing, broadly, it is those economies which have managed large growth in manufacturing exports that have seen by far the biggest expansion of jobs among the relatively low skilled. While tourism is a partial exception, most service based exports require education beyond the basics of junior secondary school. This has meant that for economies where exports have been concentrated in services, the demand has been for relatively skilled labour. If export success is limited then a pattern emerges in which jobs are seen to be both limited and more and more education is required to get them. It is this lack of jobs combined with a soaring demand for education which underpins the extent of dissent among the young in urban Africa. Many see the problem as being denied the education they need to get a job.

Table 5.1 Occupational Choices in Ghana

	Small Firm	Medium/Large Firm	Public Sector	Self-employed WITH Employees	Self-employed WITHOUT Employees	Rural	Not Employed
None							
1991/92	0.025294	0.010278	0.045668	NA	0.120683	0.78822	0.009858
1998/99	0.023851	0.017801	0.012347	0.002851	0.112699	0.801445	0.029007
2005/06	0.043289	0.009837	0.007209	0.00333	0.045357	0.853496	0.037482
Primary complete							
1991/92	0.030621	0.015342	0.048423	NA	0.135467	0.754089	0.016059
1998/99	0.03574	0.020458	0.019838	0.003758	0.13415	0.746321	0.039735
2005/06	0.077106	0.029137	0.02207	0.010606	0.070005	0.745074	0.046002
Middle/Junior school							
1991/92	0.041993	0.035818	0.123037	NA	0.135552	0.625404	0.038196
1998/99	0.043691	0.046864	0.065317	0.00168	0.150255	0.631632	0.060562
2005/06	0.140922	0.053541	0.043627	0.017346	0.078514	0.601455	0.064595
Senior Secondary school							
1991/92	0.073369	0.083361	0.298875	NA	0.137438	0.325262	0.081695
1998/99	0.082862	0.112298	0.186352	0.011057	0.186517	0.335054	0.085861
2005/06	0.200996	0.087631	0.172132	0.02615	0.100866	0.275087	0.137138
Post-secondary education							
1991/92	0.02774	0.058075	0.720797	NA	0.053332	0.132902	0.007154
1998/99	0.082601	0.079868	0.492654	0.009659	0.09476	0.163768	0.07669
2005/06	0.162936	0.083414	0.423703	0.027182	0.094058	0.121875	0.086832

Source: Nsowah-Nuamah, Teal and Awoonor-Williams (2012).

These numbers are obtained from the multinomial logit reported in Nsowah-Nuamah, Teal and Awoonor-Williams (2012) Appendix Table 2. Each row shows the probability of being in an occupation for the given level of education where this probability is evaluated at the average age of individuals in the sample. The only control included in the equation apart from education is age.

Table 5.2 Female Occupational Choices in Ghana

	Small Firm	Medium/Large Firm	Public Sector	Self-Employed WITH Employees	Self-employed WITHOUT Employees	Rural	Not Employed
None							
1991/92	0.007151	0.000755	0.002839	NA	0.361925	0.596111	0.031219
1998/99	0.007114	0.003784	0.000926	0.002552	0.306485	0.624465	0.054675
2005/06	0.028928	0.003277	0.001242	0.006879	0.198694	0.636385	0.124595
Primary complete							
1991/92	0.014518	0.001906	0.010867	NA	0.385062	0.54922	0.038427
1998/99	0.011357	0.006993	0.004725	0.002378	0.425994	0.471415	0.077138
2005/06	0.031902	0.001859	0.00759	0.015593	0.312716	0.527227	0.103113
Middle/Junior school							
1991/92	0.025835	0.018113	0.08692	NA	0.488957	0.312565	0.06761
1998/99	0.026607	0.009329	0.038204	0.004779	0.468093	0.360753	0.092235
2005/06	0.069015	0.013877	0.028136	0.027576	0.371295	0.348071	0.14203
Secondary School							
1991/92	0.061921	0.075854	0.423445	NA	0.217898	0.081669	0.139214
1998/99	0.061345	0.016467	0.136378	0.007254	0.446534	0.174398	0.157624
2005/06	0.189728	0.066135	0.158408	0.048316	0.232611	0.11272	0.192082
Post Secondary Education							
1991/92	0.014649	0.024719	0.807258	NA	0.06368	0.045153	0.04454
1998/99	1.17E-26	0.060698	0.670385	6.46E-25	0.148442	0.103323	0.017151
2005/06	0.116038	0.045836	0.46151	0.049524	0.206713	0.032441	0.087938

Source: Nsowah-Nuamah, Teal and Awoonor-Williams (2012).

These numbers are obtained from the multinomial logit reported in Nsowah-Nuamah, Teal and Awoonor-Williams (2012) Appendix Table 2. Each row shows the probability of being in an occupation for the given level of education where this probability is evaluated at the average age of individuals in the sample. The only control included in the equation apart from education is age.

Most of the urban jobs that do get created in poor countries are in very small firms and their number, and type, will depend on the investment decisions of such small firms. The degree of complementarity between skilled labour and capital varies with the size of the enterprise. This fact can explain why small firms (and farms) are good at creating jobs for unskilled labour and why the size of an enterprise is such an important aspect of the determinants of earnings from employment.

So how can this squeeze on “jobs for the unskilled” be relaxed? The source of the problem is shifts away from the demand for unskilled labour. If we are to create jobs, we need to understand the processes that can shift demand towards the unskilled. Doing so implies understanding the processes that can put the factors currently at work into reverse. So how can that be done? The answer is clear. There is a major dilemma for policy makers in that the processes that create jobs for the skilled may be very different from those that create jobs for the unskilled. In poor countries, more jobs for the skilled require a scaling up in the size of enterprises. While larger firms create far fewer jobs per unit of capital than small ones, they can create far more jobs as their costs of capital are lower and they are much less constrained in how much they can invest. However, insofar as these jobs *are* concentrated among the skilled, they fail to address the employment problem for the unskilled.

To be successful in addressing the low skill employment problem, it is necessary to ensure size and skills become less closely correlated. Larger lower skill enterprises are a key part of a successful employment generation program and the evidence points towards this only being possible with strong growth in relatively low skilled manufacturing exports. The policy issue is clear. Will improving the supply of better quality educated workers make firms sufficiently productive to be able to compete on the international market and thus provide jobs for the unskilled? If not then the factors that limit the growth of export oriented firms become as important a policy issue as the factors that limit the increase in the supply of higher quality education.

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Chapter 6 Leadership and Motivation for Skill Building and Enterprise Growth: Development of Micro and Small Manufacturing Industries

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6.1 Introduction

Micro and small manufacturing enterprises in Sub-Saharan Africa have been playing a very important role in fulfilling needs of notably low-income consumers and providing employment for a large number of people, including the youth and thereby sustaining their livelihoods (see Wangwe and Mmari, this Volume). Today, in some African countries, especially in urban areas, expansion of micro and small manufacturing activities has been observed alongside virtual stagnation of large manufacturing firms in the formal sector.

Yet, the activities of micro and small manufacturers are facing severe limitations. In most of the cases, the micro and small manufacturing enterprises are less organized than one would expect, and some survive only for a short time after being established. However, some networking among enterprises in the form of clusters has been observed. As noted by Wangwe and Mmari (this Volume), small scale manufacturers can be considered informal along a few dimensions. One dimension is registration status: some are not registered or licensed with the government, and therefore do not pay taxes. Others are informal because they avoid obedience to various government regulations.

Other features of micro and small manufacturing enterprises may be closely related to their informality. With regard to many of them, internal division of labor and specialization are rudimentary, i.e., they are not organization-intensive. Their productivity and quality of products are generally not high enough to compete against imports, and thus cannot attract broad categories of consumers, such as middle- to high-income city-dwellers. Moreover, while skill transfers between workers are taking place within or between enterprises, the transfers are not systematic enough to enhance a fast and steady empowerment of young workers. There is also need to note that micro and small manufacturers are not collaborating with their large counterparts in the formal sector to upgrade vocational training and technical skills of the young workers.

³³ The author specially appreciates the following people's valuable suggestions and supports in writing this chapter: Hiroyuki Hino, Germano Mwabu, Nobuaki Hamaguchi, Toshihiro Kanai, Shoko Yamada, Sachiko Yamao, Sayaka Ogawa, and members of the research team the names of which cannot be mentioned here.

The causes of the above mentioned situations are multi-faceted. In general, the main cause is that the environment surrounding micro and small manufacturing enterprises is not enabling. In particular, macroeconomic climate is often not favorable; the infrastructure available to enterprises is underdeveloped; and there are institutional and policy biases against them. Demand for higher quality goods is still limited or captured by cheaper imports and thus incentives for skill upgrading for quality improvement are limited. On the supply-side, activities and thus growth of micro and small manufacturers is constrained by shortage of capital and/or access to financial services, by low educational levels of workers, and by a mismatch between skill supply and demand. These constraints constitute the negative “external” factors for those enterprises. The policy interventions to modify the external factors, especially the environmental and supply-side constraints are well discussed in the literature (cf. McCormick 1999).

Here in this chapter, we define an “enterprise” as an entity which is engaged in production of economic goods or services. It includes, individuals, associations in which individuals are connected horizontally, and firms which are structured vertically or with hierarchy (Coase 1937, Alchian and Demsetz 1972, and Williamson 1981). It should be noted that in the informal manufacturing sector in Africa, boundary between an association or a firm and the outside world are sometime vague and flexible.³⁴

Also in this chapter, apart from the external constraints to micro and small manufacturing enterprises, we focus on “internal” factors: entrepreneurial leadership for organizing manufacturing enterprises and motivation for skill-building and upgrading among the junior workers within enterprises.

The main question addressed in this chapter is how to promote development of micro and small manufacturing enterprises through enhancement of leadership and stimulation of motivation. In the rest of the chapter, we discuss rationales for organizational development and skill building among micro and small manufacturers within the context of informal economies in Sub-Saharan Africa. We also explore in what ways entrepreneurial leaders can contribute to them and to the motivation of young workers’ skill building, given the present state of human resources in Africa. Then the chapter proposes policy interventions to help entrepreneurial leaders organize manufacturing activities more effectively than previously, and to motivate young workers to improve their skills.

³⁴ McCormick (1993) reports five different types of managerial organizations in the garment making in the informal sector, taking relations with the third party into consideration. From our viewpoint to explore organizational development in terms of relations within and among enterprises, the classification of the three is appropriate and sufficient at the moment, while we may have to consider differences among firms in terms of being licensed or not as elaborated later.

6.2 Micro and Small Manufacturers and Entrepreneurial Leadership

6.2.1 Rationale for organizational development

Since a “de-industrialization” phase started in the 1980s, African large and formal manufacturing firms in general have been in difficulties. Despite impressive recovery in macroeconomic growth performance beginning in the late 1990s, growth rates of formal manufacturing firms, except those related to extractive resources remain relatively low. Manufacturing expansion has been lagging behind that of consumption of manufactures by a large margin. Imports, notably, from emerging economies, including China, have been filling the widening gap between supplies and demand for manufactured goods. Imported manufactures are now widely and deeply penetrating into African markets, going not only to high-income households but also to low-income consumers. In Africa today, it is not uncommon to find clothing, utensils and appliances made in China in marketplaces in urban slums and even rural areas..

Nevertheless, some indigenous micro and small African manufacturers are surviving this competition and seemingly flourishing in such businesses as furniture making, manufacturing of construction material such as bricks, metal working, automobile repairs, manufacturing of some local alcohol and spirits, and tailoring among others. Apparently the reasons for their competitiveness against imports are as follows: production of those kinds of commodities is relatively capital-saving; furniture, construction materials, and metal works are transportation-intensive, and are expensive to import; furniture, metal works, automobile repairs, manufacturing of spirits and tailoring are sensitive to particular needs and/or tastes of domestic consumers and so their production requires customization, which can best be done locally. Finally, the local, informal enterprises producing these items often do not require sophisticated organization of production processes and can thus be “organization-saving.”

The above sorts of micro and small manufacturers tend to be self-employed and/or self-reliant, and fluid in the senses that they can easily enter production activities and withdraw, or shift flexibly from one kind of economic activity to another, perhaps in response to unstable and risky market conditions.³⁵ They are often enterprises with one person or a few people. Given these situations, we could identify at least four rationales for promoting organizational development of micro and small manufacturers in the African context.

In many cases in Africa, micro and small manufacturers are loosely and horizontally connected with each other through networks, such as the clusters. As elaborated below, enterprises have reasons for clustering, such as cooperating for procurement of materials, sharing capital goods, and sharing business information, technologies, and demand patterns for their products. Strengthened collaboration in these contexts would be beneficial for each producer. It is one of the key rationales for organizational development of micro and small manufacturers.

³⁵ In his pioneering work on informal economic activities in Accra, Ghana, Hart (1973) eloquently revealed that low-income laborers in the metropolitan city had changing and multiple sources for incomes. Behind the mentioned fluidity of production activities of micro and small manufacturers, there is multiplicities of occupational engagements and income sources. This feature might be related to generally low manufacturing skills of those laborers.

African micro and small manufacturers tend not to be permanent entities, or vertically (or hierarchically) organized with intra-organizational division of labor and specialization, through which productivity could be at least in some cases improved. The need for efficiency enhancing vertical or hierarchical integration is the second rationale for organizational development of micro and small manufacturing enterprises.

The aforementioned aspects of micro and small manufacturers in Africa are closely connected with the informality status of many of them. Most of the enterprises do not hope to be a juridical person, i.e., to self-organize themselves into a formal entity, without which status they could not obtain access to large formal financial institutions such as commercial banks or license-granting government offices. There are many reasons why enterprises may not formalize themselves. Enterprises may not feel the need to borrow large amounts of money because of their low capital intensity; they may not find "formalization" attractive due to expected tax payments and obligations; and they may perceive the juridical process of corporatization excessively costly and cumbersome. However, it may not be socially optimal for manufacturers to remain informal, i.e., to limit opportunities to expand and be productive through mechanisms that a formal status confers. This point is the third rationale for organizational development of the micro and small enterprises.

It is well known that there are various ways for young workers to acquire skills and knowledge through human relationships among those working in micro and small manufacturing. Apprenticeship is one of typical modes of skill acquisition. Also, workers can learn through copying others' superior skills and knowhow and through sharing new information. These unorganized relationships are important channels for technology transfer and for improving productivity. However, since the channels are not organized, it is difficult to increase the numbers of the workers who transmit skills to junior or less equipped workers. There is the risk that technology transfer and productivity improvement in unorganized enterprises may not be systematic, self-enforcing, or continuous. To acquire higher skills and more complex technical know-how, young workers should be *motivated* to stay in apprenticeship for a sufficiently long period of time. Motivation of a heterogeneous group of young workers requires some organization to continuously and systematically stimulate. This is the fourth rationale for organizational development of micro and small manufacturers.

In sum, there are four rationales for organizational development of micro and small manufacturers: to collaborate for input procurement and information sharing; to enhance efficient internal production system through division of labor and specialization; to access financial resources and government protection through formalization; to systematically and continuously motivate young workers to acquire skills that are essential for long-term enterprise growth.

6.2.2 Entrepreneurial Leadership

Despite the above-mentioned strong rationales for organizational development of informal manufacturers, this phenomenon has seldom occurred in Africa with certain exceptions. There must be a plethora of obstacles constraining this development and absence of entrepreneurial leadership is major one of them (Shane and Venkataraman, 2000).

Shane and Venkataraman (2000) argued that elements of entrepreneurship are not only attributes of individual leaders but also "entrepreneurial opportunities." According

to them, entrepreneurship is defined as the process where new business opportunities are “discovered, evaluated and exploited” by individuals (Shane and Venkataraman 2000: 218). They differentiate entrepreneurial opportunities from other business opportunities in that “the former require the discovery of new means-ends relationships” (*ibid.*: 220) of production. African micro and small manufacturing industries could be legitimately regarded as discoverers of new means-ends relationships if they absorb new technologies that improve productivity. Also, self-organization of enterprises into new entities with joint procurement, with internal division of labor and specialization or with internal systems of skill building could be considered as a discovery of new means-ends relationships and entrepreneurial phenomena. What we focus on in this chapter is ‘entrepreneurial leadership’, i.e., the role of leaders in the organizational development of micro and small enterprises for productivity improvement.

Needless to say, to realize organizational development of manufacturing, it is required that stakeholders have strong incentives to participate. It is widely observed in Africa that micro and small enterprises collaborate in the manufacture of a variety of items. A typical way of collaboration is loose and horizontal *association* in the form of clustering as vast literature has discussed and documented (e.g. McCormick 1999, Sonobe and Otsuka 2011). McCormick (1999) shows that clustering, even at low levels of technology can help small business entities get over the hurdles for expansion.

The present author witnessed, through a field study of an open-air industrial activity in a northern part of Dar es Salaam, an association among tens of informal furniture making individuals. They purchased lumbers and other materials such as nails together and shared the access to an electrical saw and a battery. They mutually lent and borrowed instruments such as hammers and saws. When a manufacturer was too busy to respond to orders from a customer, another manufacturer took place of him, suggesting that a furniture maker shared his own market with other manufacturers. Furthermore, it seems that junior workers in this industry could acquire the know-how of furniture making from their seniors through copying at no direct charges. Many workers in the open air cluster the author observed had undergone vocational training in carpentry at a public training institution, and could somehow train junior workers in the cluster in not very systematized way. The author also observed that the enterprises had a uniform way of contracting with customers: they accepted deliver orders for particular products on receipt of a down-payment of a half of the price for the contracted items, the remaining amount being paid when products were ready for collection.³⁶

The above mentioned type of associations in which manufacturing individuals are rather horizontally collaborating with each other may be organizationally developed into more vertically organized “firms” with centralized decision-making. Most of micro and small manufacturing enterprises are seemingly standing alone or loosely collaborating in the form of horizontal associations, however. We may have to enhance building of vertical firms from the scratch by banding individual manufactures with little mutual relations. Here, we need a fundamental thinking over factors promoting and hindering organizational development into firms.

³⁶ On the basis of the present author’s field observation over furniture-makers in Dar es Salaam in September 2006.

Let us discuss promoting factors first. As great economists indicate, vertically organized firms may be better placed to minimize transactions costs (Coase 1937, Williamson 1981). Secondly, centralized firms are more likely than horizontal associations to be more efficient in production, and to be more responsive to changes in external conditions. Thirdly, centralized firms are more able to organize collaboration in production among individual works. They can better overcome free-riding and shirking. In firms where individuals jointly work and thus their contributions to production of value added are hardly monitored by objective evidences, entrepreneurs with centralized power should assign tasks and determine rewards to each of them (Alchian and Demsetz 1972).

Notwithstanding the aforesaid legitimate promoting factors, horizontal associations may have reasons not to develop into vertical firms. Apart from possible universal mentality of manufacturing masters to stay self-reliant, they may not feel very strong needs to be organized beyond belonging to associations. Certainly their mutual collaboration had better be strengthened to reinforce their common positions as buyers and users of same materials. Some capital goods, e.g. electrical saw and batteries, are *indivisible* for them and each individual could not afford to bear initial investment. They also share the position of seekers of demand information. Yet, production process of many micro or small manufacturing including furniture-making, is *not indivisible*, i.e. they can make products individually. Also, in case of furniture production in Dar es Salaam, lower-income customers in general can be satisfied just with low quality of products achievable without division of labor and specialization. Assignment of tasks and allocation of rewards are not necessary as they are naturally made through markets i.e. individual negotiation with customers (cf. Alchian and Demsetz 1972). In sum, there are certain reasons for associations of manufactures not to be organized into firms, which one has to pay due attention to.

There, however, would be justifications to strengthen leadership even for associations. Concretely speaking, entrepreneurial opportunities in the sense of a new means-ends relationship in production can emanate from several sources, including invention of new technologies; changes in product markets; and changes in factor markets (Shane and Venkataraman 2000, Drucker 1985, Schumpeter 1934). Invention includes not only new production technology per se but also introduction of new methods of production or new ideas of organizing productive activities. For micro and small manufacturing enterprises including both associations and firms, to discover and apply them into real production process, strong leadership is likely to be very necessary. Leadership is required to convince members to change themselves, to overcome opposition to change and to motivate members to acquire new skills, knowledge and methods of working. Also, needless to say, leadership is very important to restrain free-riding in cases of not only firms but also associations.

Meanwhile, in the reality of African cities, many micro and small enterprises remain as individuals or loose and horizontal associations as indicated above. Yet, there is exceptional development of some firm-like enterprises. The present author has also observed at least three different organizational modes in Tanzania's furniture-making: first, a loose open-air cluster of furniture makers (an *association* as defined in this chapter); second, a structured, but unlicensed firm that kept stocks of ready-made products (a less organized mode of *firm* defined in this chapter); third, a licensed furniture firm with seemingly higher quality ready-made products (a more organized mode of firm). Though more detailed studies are necessary, it appeared that the more structured enterprise were, the more jointly they were working i.e. several workers were

participating in completing one product and the higher quality of products were achieved. The second and the third modes of enterprises were probably responding to newly expanding demands for better quality commodities from higher-income consumers.³⁷ Moreover, McCormick (1993, 1999) shows that in some clusters, there had begun "specialization and differentiation" associated with higher efficiency. These observations suggest that African informal manufacturers can change from loose associations to more structured firms.³⁸

Either in case of leading members of associations to undertake changes or in case of building vertical firms from the scratch, it would be difficult for entrepreneurs to mobilize people with certain amounts of rewards, as any results after changes are uncertain before mobilization. Here, transformational or visionary leadership, rather than transactional leadership matters (Burns 1978, Bass 1985; 1990, Sashkin 1978. Cf. Alchian and Demsetz, 1972). Also, we have to think about how to motivate workers with non-economic measures.

6.3 Social-cultural Context of Entrepreneurial Leadership

6.3.1 Leadership in African History

African history, both pre-modern and modern, is full of leadership stories. Leadership in traditional African societies was structured by social and moral obligations governing the leader and his or her followers (Berman and Lonsdale 1992). Nevertheless, African political leadership under moral institutions or other constraints did not achieve expected development outcomes during the early days after independence. Still, it is hard to claim that Africa has lacked leadership per se. What seems to be in short supply on the continent is entrepreneurial leadership – leadership that can contribute to transformation of micro and small manufacturing enterprises through organizational development. Several factors in Africa seem to constrain the flourishing of this kind of leadership..

First, as McCormick (1993) convincingly shows, micro manufacturers that were established two decades ago are still small. It is difficult to argue, as some have done (Collier and Gunning, 1999) that high risks of doing business in Africa is the main constraint on enterprise growth. Staying small may indeed be a rational response to a risky environment, where business failure can lead to devastation of livelihoods (McCormick 1992). However, since entrepreneurship is about taking risks, it is reasonable to assume that stagnation of small enterprises in Africa is due to insufficient level of entrepreneurial leadership.

³⁷ On the basis of the present author's field observation over furniture-makers in Dar es Salaam in September 2006. The second mode of firm received an order for a particular type of furniture (coffin) from foreign customer i.e. it actually exported it.

³⁸ There is the question as to whether an enterprise loses its informality status after organizational transformation. Since informal and formal enterprises are known to operate along each other, producing the same products, the informality aspect is perhaps a trivial attribute of an enterprise.

Second, there seem to be factors embedded in socio-political history of Africa that do not promote entrepreneurial leadership. During the colonial times manufacturing entrepreneurship was largely concentrated among non-African people. Among Africans, business leaders tended to be limited to certain social groups due to different degrees of exposure of ethnic groups to school education and commercialization. After independence, the social status of political leaders became disproportionately elevated relative to that of business leaders. Due partly to deep state interventions in the formal sector of the economy (Bayart 2009), the African youth see involvement in politics as more rewarding than establishing a business. As a result, African children and youth can hardly find role models in manufacturing industries.

Third, generally speaking, African education systems have weaknesses in teaching science, technology, and mathematics. Skills that are essential in manufacturing are not taught in schools. Consequently, many youths likely leave school with insufficient skill, knowledge and motivation for a career in manufacturing.

A bright aspect of Africa's social transformation since the late 1990s is the continued expansion in basic education. Under the Education for All (EFA) initiative, schools, classrooms and the number of teachers have increased. These increases, combined with the abolition of school tuition, have contributed to a dramatic growth in primary school enrollment in Africa. Nonetheless, the quality of education available is questionable (Nishimura and Ogawa 2008 and Nishimura et al. 2009). Although enrollment has increased, repetitions, dropouts and absenteeism are prevalent and thus rates of school completion have remained low. Pupils' levels of academic achievement, especially in mathematics and science, are wholly unsatisfactory. Deficiencies in teaching science, technology, and mathematics at basic education levels severely limit acquisition of the knowledge and skills required to discover entrepreneurial opportunities in workplaces.

6.3.2 Changing leadership culture

It is often said that leadership cannot be taught. However, even if leadership is something that grows from within an individual without external influence, it is still worthwhile to discuss initiatives that can be implemented to stimulate it (not to generate it, as it is presumed to exist potentially).

First of all, it appears that entrepreneurial leadership in manufacturing is likely to emerge and grow in a society where people are endowed with knowledge about manufacturing methods and processes, and where transformational economic activities are encouraged.

Politicians, journalists, and religious leaders can endorse the importance of entrepreneurial leadership in manufacturing, and devise interventions to encourage the youth to learn business and manufacturing skills and support the youth to establish manufacturing enterprises, or expand them. The aid agencies can document for the African youth, examples of entrepreneurial experiences, including successes and failures, in initiating, expanding or formalizing small manufacturing enterprises. Particularly valuable would be examples of how new manufacturing business ventures by youths, and organizational development of particular firms have been achieved. Entrepreneurs' own narratives of how they started their enterprises can be motivating and inspiring. Similarly comparative narratives from different parts of the world, that highlight differences in contexts of entrepreneurial innovations could help African

youths perceive business opportunities in manufacturing in their own contexts. Messages about entrepreneurial leadership can be passed to the youth through workshops or mass media. A forum for African youth to share their entrepreneurial experiences should be considered.

To empower the youth who have completed primary education or those who have dropped out but are too old to resume conventional schooling, remedial courses could be provided, with emphasis on science, technology, or mathematics, depending on interests and preparation of learners.

6.4 Training for entrepreneurial leadership and motivation

6.4.1 Non-economic considerations

As already noted, leadership may not be possible to promote directly through teaching. We could say largely same thing concerning motivation for learning skills and successes in business. However, their indirect promotion may be possible through well-designed programs. The key assumption is that enhancement of the human resource is positively correlated with entrepreneurial leadership and with the motivation to learn, or succeed in manufacturing, or in any business. For this purpose, we propose a training program with three elements to be implemented.

The first element of the program is a *learning module* for helping the youth understand processes of manufacturing, as comprehensively as possible, placing them in a position to imagine eventually how they could operationally well manage and hopefully reorganize the process, perhaps by dividing it into segments, thus creating opportunities for specialization and efficiency enhancement. The second element of the program is a practicing or *apprenticeship module* that allows the youth to apply the skills they have learned or upgraded before starting to work on their own. The third element is the *mentoring module* that allows the youth who aspire to be business leaders, or selected as such, to practice how to motivate other workers to build skills or to be committed to the enterprise without an economic reward. This third element is an apprenticeship for nurturing entrepreneurial leadership, and its prerequisites are the first two elements of the training program. The reason for the two prerequisites is that an entrepreneurial leader must understand operational processes of a business, and must have the skills to operate and transform a manufacturing business. While this requirement may not be universal, it is certainly essential for growth of micro and small manufacturing enterprises in Africa that almost invariably, start as business entities with very few workers.

The focus in this section is on motivation without economic incentives because only very rarely can micro and small manufacturers afford to pay high, merit-based wages that would motivate employees to be committed to the enterprise, or to acquire or upgrade their skills. Efforts must therefore be made to motivate workers to cultivate attachment to the enterprise and to build the skills required to exploit entrepreneurial opportunities without using monetary rewards as incentives. While the approach to motivate workers might be deemed as irrelevant and unrealistic by traditional economics, recent researches straightforwardly admit importance of "intrinsic

motivation" based not on economic incentives but self-esteem (Bénabou and Tirole 2003).³⁹

Moreover, the owner of the enterprise should be similarly motivated, i.e., work without large residual claims (Alchian and Demsetz 1972). It is important to recognize that in the initial stages of an enterprise's existence, sacrifice of wages (by employees) and profits (by owners) can lead to high wages and large profits in the future, as such sacrifice can help an enterprise or firm grow. The assumption here is that employees and owners of manufacturing enterprises can be taught or supported to trade off small short-term monetary benefits for high quality employment in the future. Then, we could understand further importance of considering non-economic measures to motivate.

We propose introduction of motivation enhancing training programs among youths who are unemployed or with little education (those who have completed only primary education or less) in relatively capital-saving manufacturing context. In implementing the programs, instructors would be guided by the three modules outlined above. Moreover, both workshop-based and enterprise-based training sessions would be implemented.

To design the training programs, we must understand what motivates human-beings to pursue their goals. According to Kanai (2009), motives and needs that govern changes in motivation include those derived from tension and deficiency on the one hand (cf. Maslow 1998) and those derived from hopes and expectations on the other (cf. Ota 2007, Snyder 1994, and McClelland 1987). Entrepreneurs can raise tension among subordinates lacking tension by creating a sense of crisis or urging them to work hard. Alternatively, the leader might raise the potential for success by encouraging those lacking hope. The pair of these two motivational systems has profound implications on design of training programs.⁴⁰

6.4.2 Managing Tension and Instilling Hope: Training of Entrepreneurs

Workers may experience tension when unable to finish assigned tasks (Lewin 1945; Takahashi and Kanai 2008). Such workers might be in a circumstance where they feel

³⁹ Bénabou and Tirole further argue that economic incentives may be feeble motivators in the short-term and may be negative motivators if withdrawn (Bénabou and Tirole 2003: 492). As to non-traditional economist argument on "intrinsic motivation," also refer to De Charms 1968 and Deci 1975.

⁴⁰ Kanai (2009) states that there are largely four series of the literature which explain sources of workers' motivation. In addition to raising tension and instilling hope, he introduces two other schools as follows. One is stressing that individual workers (and possibly also entrepreneurs) have own practical theories-in-use to regulate one's motives for works. The role of one's own theory is significant if one wishes to regulate one's own motivation rather than simply be driven by external conditions (cf. Argyris and Schön 1974). The other is stressing that roles of inter-human relations. One does not live in isolation, nor does one work alone in perpetuity. Accomplishing tasks together with others helps forge relationships. If others maintain healthy tension and work hard, one is likely to be influenced by their attitude (cf. Alderfer 1972). In environments where firms have been well established, these two sources of motivation might be very important. This, however, is not the normal case for our micro and small manufacturing enterprises. In our designing of the training modules, we would like to select only tension and hope which could be much more easily operationalized.

pressured by the enterprise to finish tasks as scheduled. As is sometimes the case, showing the workers how their progress compares with that of fellow workers might further raise tension by promoting psychological competition. Tension management should be an important aspect of training program designed to boost motivation .

Training programs should also employ measures aimed at instilling hope. This can be accomplished in two ways. First, during the program, trainees should be praised by instructors each time they progress to a new phase, which would enhance the formers' self-confidence. Second, successful completion of the training programs should increase the potential for trainees to secure regular employment, to reinforce their status in the enterprise, or to establish own businesses..

An important unique trial in the above-mentioned training programs is to select prospective entrepreneurs themselves to be trained as instructors, to acquire know how to motivate junior workers for skill upgrading through *on-the-job training* in manufacturing enterprises. Not only existing firms but also associations possibly with clustering could participate in the on-the-job training. In either case, entrepreneurial leaders willing to develop their enterprises organizationally are to be selected. In the on-the-job training, the above-mentioned three modules are to be flexibly combined and applied. It is hoped that through the on-the-job-training, prospective entrepreneurs could learn better leadership effective to materialize not only workers' skill upgrading but also organizational development and thus enterprise growth. Advisors who could provide clues to leaders to devise ways to improve the latter's production activities perhaps should be assigned to the on-the-job training program. Assigned advisors and instructors can discuss with entrepreneurial leaders possible inventions applicable to initiate the process of entrepreneurship.

Convincing African manufacturers to participate in the training programs might prove difficult and recruitment should be undertaken as carefully as possible. After all, enterprises might fail to see the merits in participation, or feel that by increasing the number of skilled competitors, such training could pose a risk to their own market position. Nevertheless, as mentioned above, it would be beneficial for the enterprises and entrepreneurial leaders to acquire know-how of the systematized on-the-job training programs by themselves. Then, they could customize that know-how so that it could be applied to their day-to-day practice of motivating their employees to work hard for the enterprise or firm and to improve their skills. The training can help enterprises develop and ultimately formalize.

6.5 Conclusion

Leadership and motivation are essential for survival and growth of small-scale manufacturing enterprises in Africa. Micro and small manufacturing enterprises on the continent face high risks of failure or stagnation because they operate in the informal sector without an enabling business environment. In particular, informal enterprises lack social infrastructure, such as electricity, industrial water and sewerage, and police services. Moreover, their domestic market shares are open to severe competition from cheap imported goods of uncertain quality. The problems of poor infrastructure and severe competition are compounded by workers with little or no skills and who may not be motivated to work hard or stay on the enterprise because of low pay they receive, which is characteristics of urban informal employment discovered very early (Hart

1973). It is hoped that training programs that promote entrepreneurial leadership and boost motivation without financial rewards can go a long way in putting African informal manufacturing enterprises on a sustainable growth path. It has been shown that such a program should provide the youth with an understanding of the whole manufacturing process in addition to teaching them operating skills. Moreover, in a risky business environment, entrepreneurial leadership is essential for survival and expansion of an enterprise. Equally important, is non-monetary motivation of workers in a context, such as Sub-Saharan African, where wages are low due to low labor productivity. The chapter has shown that it is possible to design mechanisms that will motivate the workers, as well as enterprise owners, to forego short-term wages and profits in exchange for high quality employment in large firms in the future. Thus, despite the intrinsic and unobservable nature of entrepreneurial leadership and motivation, they can nonetheless be stimulated or promoted by carefully designed and implemented training programs.

A training program to boost motivation is aimed at breaking the “vicious circle of hopelessness,” where low motivation begets a lack of marketable skills and negative work attitudes, leading to marginalization in the workplace and to low motivation. Similarly, training for entrepreneurial leadership is directed at enabling enterprise owners to pull their enterprises out of stagnant states by giving them the skills to perceive and exploit profitable opportunities in risky business environments. Promotion of these two intangible determinants of enterprise growth – leadership and motivation – could substantially increase productivity of informal manufacturing enterprises in African economies.

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***PART 3 Creating Quality Jobs in Agriculture and
Pastoralism***

Chapter 7 Raising Productivity of Smallholder Farming

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7.1 Introduction

Promoting rural employment is one of the major concerns of development policies in Sub-Saharan African countries, as this is likely to be the most effective intervention for combating poverty at its roots. The World Development Report 2008 estimated that up to 75 percent of the world poor lived in rural areas and earned their living from agriculture in the early 2000s. The only way, therefore, to reduce overall poverty is to initiate actions that significantly cut rural poverty. Several factors bear on any effort to curb rural poverty. Among them, demographic factors, especially population growth, are very important. Another important factor is poverty itself: the poor, often, cannot invest enough to rise out of poverty. Reardon and Vosti (1995) termed this insufficiently low investment as “investment poverty”, whereby rural poor could just be trapped into a loop of poverty no matter how much they invest.⁴¹ To break the vicious cycle, one way for the rural poor is to use the only asset they have: own labor to earn extra income for investment (Nkurunziza, 2006; Kinda and Loening, 2010). However, moving out of poverty through this mechanism depends on how well the labor market works for the poor (see Chapter 1).

Employment creation in rural SSA requires a diversification of the farm economy. Diversification of the farm economy is, for Barrett, Reardon and Webb (2001), a means of escaping poverty. As farm people diversify, they create jobs either for themselves, or for individuals outside of the household. Two types of factors promote diversification: the “push factors” (i.e., factors that push people away from farming), such as high risks and large transactions costs and the “pull factors” that attract people to sectors outside agriculture, e.g., complementarities between crop and livestock activities and employment in urban areas.

According to Reardon and Vosti (1995), a rural household can diversify into five types of assets, namely, (i) natural resources (e.g. water, biodiversity, land); (ii) human endowments (e.g. education, health, household size); (iii) on-farm resources (e.g. livestock, farmland, equipment); (iv) off-farm resources, and (v) community-owned resources, such as roads, dams, and social institutions. According to World Bank (2008), the three core household assets are land, water, and human capital. These assets are often squeezed by population growth and/or environmental degradation. The SSA countries unfortunately face grave scarcities in these key assets: land holdings per head are too low and declining, land is severely degraded, water is not secured due to insufficient investment in irrigation, and the state of health and education is very poor (World Bank, 2008). Households that are below the poverty line

⁴¹ Reardon and Vosti introduced the concept of investment poverty to provide a framework for linking the environment to household poverty.

and lack several of these assets may never move out of poverty. When the overall rural economy lacks dynamism, it cannot generate quality labor employment, which is the channel through which the poor move out of poverty. However, promoting employment in Africa, amidst so many constraints is a major challenge. This chapter looks at how rural employment in SSA can be promoted.

Analyzing the employment problem for sub-Sahara Africa as a whole is rather a daunting task, given the substantial heterogeneity that prevails in this part of the world. While in a country like Cameroon, farmers can enjoy up to four rain-fed crops each year, in the Sahel and other arid or semi-arid parts of the continent, the reality is far from this luxury. In Burkina Faso, for example -- a typical semi-arid country, there is only one rainy season that lasts three to four months, meaning that for 8-9 months every year, farmers have to remain idle as far as rain-fed cropping is concerned. Analyzing employment creation in agriculture in so varied environments may thus require some categorizations and assumptions. Yet, despite the abundant but differentiated natural resource endowments of the continent, most of the SSA countries are poor, and that poverty is concentrated in rural areas. Poverty is therefore the unifying thread that makes continental level analysis of the African employment challenge meaningful. To account for heterogeneity across large sections of the continent, data will be considered on a regional basis.

Although raising employment in agriculture is an important issue to consider, one should note its ambiguous nature. It is expected that as development proceeds, the contribution of the farm sector to total employment will fall. For example, Fields (1984) notes that the proportion of workers employed in agriculture has fallen in three of the successful Asian economies: Korea, Singapore, and Taiwan. Growth of manufacturing exports has been the driving force behind economic growth in these countries, and the manufacturing wage there is considerably higher than the agricultural wage. Thus, enhancing the role of agriculture in employment creation through higher farm productivity should be seen as a transitory phase that will take SSA up to the point where agricultural labor will begin shifting to the a high productivity urban nonfarm sector -- where manufacturing activities will be located.

The chapter first reviews the current situation in farming in Sub-Sahara Africa, highlighting low productivity in small farms and the implications of this on youth engagement in agriculture. Following this introductory part, the rest of the chapter develops a conceptual framework through which the linkages between agricultural productivity and agricultural employment can be understood. The challenges that need to be addressed to create youth employment opportunities in smallholder agriculture are highlighted and include inefficient or inequitable land tenure regimes, soil degradation, over-population, insufficient rural infrastructure, poor access to high quality inputs (fertilizer, seeds), and limited access to markets and credit. Next, the chapter considers the potential of reformed smallholder agriculture as a job creating sector. Finally, we make recommendations on how to address the challenges facing employment creation in smallholder agriculture in Africa.

7.2 Linking Rural Employment to the National Economy

Rural employment is defined here to mean employment of rural residents in rural areas. Employment through migration to urban zones is however not excluded from this definition. The definition focuses attention on employment-led rural development,

whereby forces within the rural area or even from without contribute to the ability of rural economies to generate employment for rural residents.

To simplify the analysis, we define two types of migrants: types A and B. Type-A migrants respond to better opportunities elsewhere, after exploiting all available opportunities in their original rural setting. Type-B migrants are marginal rural residents, who abandon a low productivity activity to engage in uncertain activities in another setting. Type-B migrants are of a Lewis type (Lewis, 1954), except that Lewis supposed that the urban areas where these migrants go have some jobs ready to grab. While any outmigration can be considered a leakage to the rural economy, type-A migration could be beneficial as the departure of productive individuals could offer the opportunity for others in rural areas to move up the income ladder. Moreover, the remittances sent later by type-A migrants help the rural economy. Type-B leakage is bad for the overall economy because it increases unemployment in the destination sites without contributing to any positive change in the sending area. In this setting, outmigration is a leakage to the rural economy. The leakage might be beneficial if it is motivated by exhaustion of employment opportunities in rural areas. This type of migration was uncovered in Burkina Faso, where rich, progressive farmers moved from their original settlements to a new, urban settlement with opportunities for commercial activity (McMillan, Nana and Savadogo, 1993)⁴².

In many cases, the employment created in rural areas is likely to be informal in nature. For labor theorists, informal employment stands in opposition to formal employment but neither is superior to the other. Kucera (2008) argues that some workers may choose informal over formal work, in accordance with voluntary informal employment hypothesis. In this sense, there is no direct relationship between formality or informality of employment and poverty. Informal sector workers can be better-off than workers in the formal sector and vice versa. Thus in discussing employment in agriculture, there is no need to pay attention to formality or informality of economic activities. Any income earning activity, whether wage or nonwage or formal or informal fits our definition of employment. The chapter departs from the earlier literature where informal employment is viewed as inferior to formal employment (Lewis, 1954; Fields, 1975).

Employment generation at a macro scale may require support from policies that promote agricultural intensification (leading to increased farm income relative to nonfarm income) and greater agricultural diversification (leading to increased nonfarm income relative to farm income). In order to create opportunities for employment creation in rural areas, policy should be designed to affect the two key pillars of a rural economy, namely, agriculture and the nonfarm sector. In this chapter, we avoid what Dercon (2009) terms 'simplistic premises', referring to the common view that since agriculture is the sector that employs most of the poor, this sector must be the basis for poverty reduction efforts. We explore employment effects of increasing agricultural productivity, while at the same time examining work opportunities in the nonfarm sector. As is hypothesized in Ndulu and others (2008), the countries in SSA can be classified into three clusters: (i) resource (oil, minerals) abundant countries; (ii) coastal, well-located countries, and (iii) landlocked, resource poor countries. The three groups face

⁴² In this study, the authors found that successful farmers in a government sponsored settlement left their plots and homesteads for a new area where a dam had been built. The dam accelerated urbanization of a nearby small town, spurring new, significant trade opportunities next to agricultural areas.

different employment opportunities and challenges, a fact that should be taken into account in the design of employment policies.

It is worth stressing that promoting employment in rural areas in Africa should harness the synergy between agricultural and non-agricultural sectors of rural economies. The nonfarm production sector is linked to the farm sector in a manner due to Start (2001). For Start (2001), and other believers in agricultural-nonagricultural linkages (e.g. Haggblade, Hazell and Brown, 1989), the linkages between the two sectors are direct and indirect. The direct sectoral linkages are of production and consumption in nature. Forward linkages connect smallholder agriculture with the processing, packaging, transporting and selling of agricultural products, or with the construction of agricultural storage and marketing facilities. These forward linkages raise the output of farms and of household enterprises. The backward linkages involve connections between production in smallholder agriculture and supplies of farm tools and other inputs.

Although the above direct linkages are often the most significant in the development of smallholder agriculture indirect linkages also exist. For example, investment in rural areas that leads to capitalization of the rural economy (Reardon, Crawford and Kelly, 1994); creation of human capital in nonfarm sector that is used to boost agricultural productivity (Timmer, 1995); part-time subsistence farming, which keeps cost of living low and in turn contributes to multi-sectoral growth (Hart, 1998); investment in infrastructure (power, water, transport, and communication infrastructure) that contributes to growth in other sectors; and supporting market and business networks in one sector that help growth in other sectors.

Growth spurred by sectoral linkages in rural areas will generally increase the need for hired labor, thus increasing overall employment in villages. Start (2001) noted that growth in microenterprises is not a panacea for youth unemployment because not everyone in smallholder agriculture has the ability to manage a business.

In the study of diversification, assets, activities and income are the three commonly used terms. Assets can be accumulated and are a store of wealth and sources of income. Activities are flows of services and income is derived from assets. One major characteristic of assets in a rural setting is its lack of flexibility: a plough can only be used to prepare a field. Such fixity may adversely affect farmers' ability to invest and generate employment because it is a source of high variability in asset returns. To make the discussion on farm level employment precise, we adopt definitions of key terms due to Barrett et al. (2001).

The literature on diversification of rural economies frequently uses the terms off-farm, non-farm, non-agricultural, and non-traditional to describe the different activities or sectors in which the rural people invest their assets. Table 7.1 uses these terms to classify sectors, incomes and activities of rural economies in Africa.

As can be seen from Table 7.1, employment can stem from demand for on-farm labor, from demand for hired labor or from an increase in productivity or agricultural trade (Sandrey et al. 2011); as well as from sectoral shocks (Bigsten and Tengstam, 2011).

Table 7.1 Classification of rural sectors and incomes

Sectors (1)	Wage employment		Self-employment	
	Local (2)	Migratory (3)	Local (4)	Migratory (5)
Primary				
Agriculture	Local agricultural labor income	Migratory agricultural labor income	Local own farm income	Migratory own activity income from farming
Mining and other extractive	Local labor income	Migratory labor income	Local income from self-engaging in mining activities	Migratory income from own mining activities
Secondary				
Manufacturing	Local labor income	Migratory labor income	Local income from own manufacturing activities	Migratory income from own manufacturing activities
Tertiary				
Services	Local labor income	Migratory labor income	Local income from own commercial activities	Migratory income from own domestic activities

Source: Adapted from Table 1, Barrett, Reardon and Webb (2001).

Notes: Column (1) shows the main sectors in a rural economy. Columns (2) and (3) depict wage employment – local and migratory, across different sectors; similarly, columns (4) and (5) display self-employment activities and incomes.

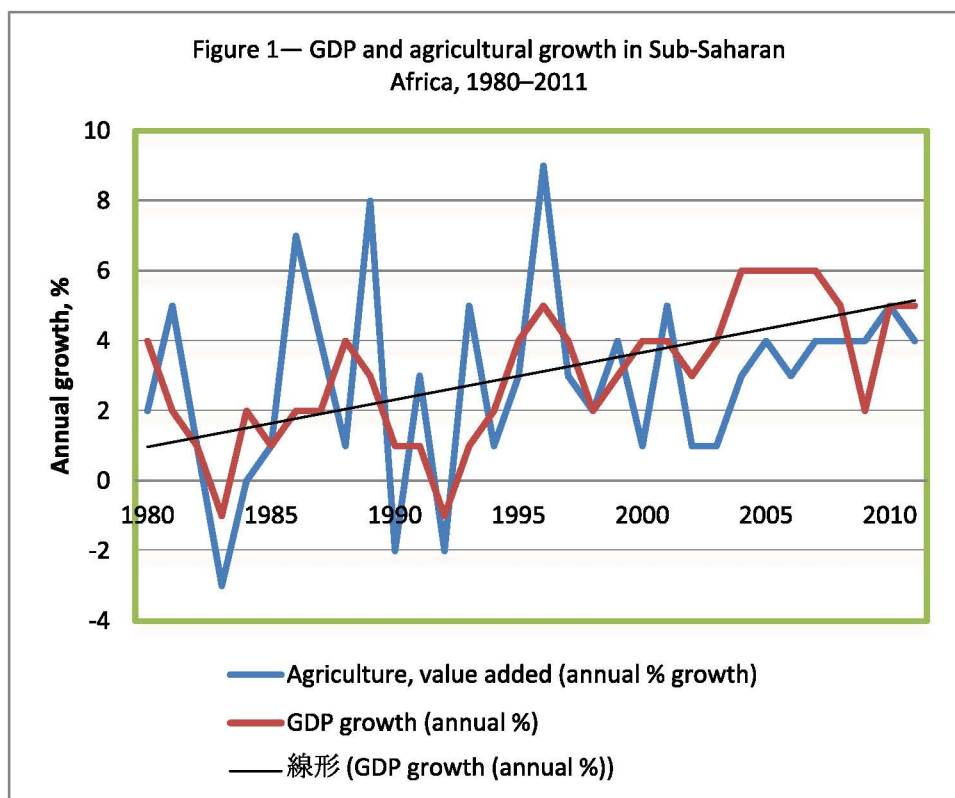
7.3 Overview of African Agriculture

Agricultural policies in most African countries tax farmers to cater for the needs of the urban population. Before the Comprehensive Africa Agricultural Development Program (CAADP) became one of the driving forces behind recent renewal of agricultural policy making in Africa, African agriculture was mostly neglected by governments and donors (Future Agricultures, 2010). Macroeconomic policies were distorted, with heavy direct and indirect taxation on agriculture. Indirect taxation through overvalued local currencies and the protection of industries worked to reduce prices of farm produce by 24 percent, on top of the 12 percent reduction caused by direct taxation (World Bank, 2008). What is paradoxical is that the poorest countries in the world tend to tax agriculture the most, while the rich, industrial countries typically offer subsidies to their farmers.

The policy reforms of the 1980s and 1990s involved macroeconomic adjustments and the improvement of resource allocation across sectors. The policies reduced taxation in Africa agriculture (World Bank, 2008). For the first time since independence, Africa registered a steady growth in GDP and agricultural production (Figure 7.1). In 2003 in Maputo, the African Heads of States adopted CAADP, an affirmation of their commitment to putting agriculture first in the development process. CAADP is now the reference framework of agricultural policy making in SSA countries. The key CAADP

principles state that each member country should allocate 10 percent of budget expenditure to agriculture, pursue a six percent annual agricultural growth rate, and strive to reduce poverty. CAADP put structure around agricultural development actions after the macroeconomic reforms had paved the way growth. Figure 7.1 shows that agricultural performance in Africa has been positive over the last 20 years, but with occasional dips due to worldwide events, including the 2008 financial crisis.

Figure 7.1 GDP and agricultural growth in Sub-Saharan Africa



One worrisome aspect of the long-term evolution of agricultural production is its instability. Even at the aggregate level, the erratic character of growth in agricultural production is apparent (Figure 7.1). The cotton production index is the most unstable, followed by that of maize (Table 7.2). Looking at cotton production index for Southern Africa, significant gains are evident from the 1970s to the 1990s, followed by a downward spiral in the 2006-10 half decade.

Table 7.2 African agricultural production (1971-75=100)

Years	Cassava	Cotton	Maize	Paddy
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				rice
Africa				
1971-1975	100	100	100	100
1976-1980	113.1	89.3	111.1	108.7
1981-1985	127.7	92.9	112.7	120.0
1986-1990	151.1	104.1	148.2	151.0
1991-1995	194.9	99.4	151.6	188.8
1996-2000	213.4	124.0	175.0	219.7
2001-2005	246.9	139.8	188.7	243.6
2006-2010	287.3	110.4	231.1	309.4
Eastern Africa				
1971-1975	100	100	100	100
1976-1980	114.0	76.5	116.9	107.4
1981-1985	142.1	76.7	119.5	109.8
1986-1990	149.3	89.5	146.9	133.4
1991-1995	141.3	78.3	132.3	138.6
1996-2000	161.5	105.9	166.5	155.6
2001-2005	188.5	121.7	178.8	184.6
2006-2010	207.7	129.8	232.8	266.4
Middle Africa				
1971-1975	100	100	100	100
1976-1980	109.1	82.0	97.7	114.9
1981-1985	126.1	90.6	100.6	134.5
1986-1990	147.4	102.6	114.4	165.9
1991-1995	161.3	110.8	141.4	185.3
1996-2000	156.4	149.8	177.8	182.5
2001-2005	173.5	134.8	201.2	181.5
2006-2010	210.0	93.4	260.0	207.5
Southern Africa				
1971-1975	100	100.0	100.0	100.0
1976-1980	109.1	166.7	110.3	102.6
1981-1985	126.1	148.9	96.9	69.2
1986-1990	147.4	231.2	107.8	76.9
1991-1995	161.3	103.5	94.0	51.3
1996-2000	156.4	150.4	111.7	35.9
2001-2005	173.5	94.3	114.4	43.6
2006-2010	210.0	41.1	120.4	38.5

Table 7.2 (continued)

	Cassava	Cotton	Maize	Paddy- rice
Western Africa				
1971-1975	100	100	100	100
1976-1980	116.6	141.3	91.8	118.9
1981-1985	116.8	167.5	133.5	151.5
1986-1990	157.7	320.5	328.2	210.6
1991-1995	279.8	434.3	430.2	253.9
1996-2000	321.6	631.0	408.2	285.9
2001-2005	378.5	717.8	463.4	303.8
2006-2010	442.2	526.3	623.9	417.3

Source: Computed from FAOSTAT (2013).

7.4 Employment Potential in Smallholder Agriculture

Smallholders are defined here as farm sizes of less than 2 hectares. This is not the only possible definition, as other definitions include total production and quantities of fertilizer used by farmers. Smallholders make up the majority of farms almost anywhere in the world, except in the industrialized countries. In Asia, Africa, and the countries of former Eastern Europe are all homes to smallholder agriculture.

Land reform has been one of the key instruments used in Asia to create jobs in agriculture. The essence of land reform in Asia was to create small farms, a fact that suggests that the large numbers of smallholders in Asia shown in Table 7.3 were policy induced. Given imperfect credit markets and exploitation of farmers by money lenders, governments intervened to make farm credit affordable. The Grameen Bank in Bangladesh is an example of a micro financial institution built for the poor. In the 1990s, as industrial factories lured farmers for employment in a context where Asian agriculture was labor intensive, governments intervened to facilitate access by farmers to equipment suitable to their farming environment (Fan and Chan-Kang, 2005). Other actions taken by governments included heavy investment in rural and irrigation infrastructure. The government also invested in health and education facilities that upgraded the human capital of farmers. The improvement in the quality of the rural population became the source of large productivity gains witnessed later in Asian agriculture.

The Asian reforms on agricultural inputs and infrastructure offer important lessons for Africa. The structure of reforms undertaken in Asia suggest that Africa needs a package of complementary investments in farm inputs and agricultural infrastructure to increase agricultural productivity and generate quality employment. The income from nonfarm sector can be used to finance farm development programs (Savadogo, Reardon, and Pietola, 1994). There are both demand side and supply side opportunities for the SSA smallholder agriculture.

Table 7.3 Top five countries with the largest number of small farms in Africa region relative to other regions

	Census year	Number of farms under 2 hectares	Share of farms under 2 hectares, percent
Asia			
China	1997	189 394 000	98
India	1995–96	92 822 000	80
Indonesia	1993	17 268 123	88
Bangladesh	1996	16 991 032	96
Viet Nam	2001	9 690 506	95
Africa			
Ethiopia	2001-02	9 374 455	87
Nigeria	2000	6 252 235	74
DR Congo	1990	4 351 000	97
Tanzania	1994-95	2 904 241	75
Egypt	1990	2 616 991	90
Americas			
Mexico	1991	2 174 931	49
Peru	1994	1 004 668	58
Brazil	1996	983 330	21
Ecuador	1999-2000	366 058	43
Venezuela	1996-97	113 421	23
Europe			
Russia*	2002	16 000 000	98
Ukraine	2003	6 214 800	99
Romania	1998	2 279 297	58
Bulgaria	1998	1 691 696	95
Poland	2002	1 494 100	51

Source: Oksana Nagayets, 2005.

* Data based on farms of less than 1 ha of size.

The agricultural sector in Africa faces growing global and regional demand for agricultural products for food, feed, industry and fuel. In an interesting study arguably foretelling the future fate of African agriculture in the face of rising demand for meat, Delgado, Rosegrant, Steinfeld, Ehui and Courbois (2001) wrote:

“A revolution is taking place in global agriculture that has profound implications for human health, livelihoods and the environment. Population growth, urbanization and income growth in developing countries are fuelling a massive increase in demand for food of animal origin. These changes in the diets of billions of people could significantly improve the well-being of many rural poor.”

In contrast to supply-driven green revolution in Asia and Latin America, the now likely livestock revolution in Africa will be demand-driven. Delgado and colleagues note that

the consumption of meat in developing countries had grown three times as much as in the developed world between the 1970s and the 1990s. The authors predict a sharp increase in the demand for feed made mostly of grain produced by smallholders. In light of the projected large increases in the demand for meat in newly industrialized countries, it is predicted that the world will need to supply an additional 292 million metric tons of cereals between 1993 and 2020 as feed for livestock. With proper investments, the African livestock and crop sectors can benefit significantly from the projected global rise in demand for meat.

SSA has arable land that is still unexploited. It is estimated that of the 1000 million hectares of total arable land in SSA countries, 800 million remain unexploited, offering enormous potential for further agricultural development. Compared to other regions such as South Asia, where there is practically no more land to farm (Livingston et al., 2011), SSA is a land abundant region. The same is true of irrigable land. It is estimated that less than 3% of land suitable for irrigation is actually irrigated in SSA, which highly contrasts with 36% for Asia and 11% for Latin America (FAO, 2005; cited in Livingston et al., 2011). In addition to bringing new lands into cultivation, smallholder agriculture can further be strengthened through investments in new seeds, fertilizers, and farm mechanization to substantially increase its output.

Moreover, a new form of agricultural extension system is needed to bring agricultural science to smallholder agriculture in Africa. Currently, African farmers are isolated, as are the agricultural scientists. In particular, university site research is rarely linked to the needs of smallholders. What is needed is government establishment of a new institutional structure whereby public funding would be provided to agricultural scientists based in universities and national agricultural research institutions under condition that they would build durable linkages with farmers, through appropriate mechanisms. In many African countries, farmers' organizations are operational and these can be used to link scientists with farmers in ways that were not feasible years ago. Such linkages can be established at local, national and regional levels.

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Chapter 8 Market Access, Technology Adoption, and Rural Development

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8.1 Introduction

A half of population lives under the poverty line (1.25 PPP USD) and two thirds live in rural areas in Sub-Saharan Africa.⁴³ Most of the rural residents rely on small-scale farming for their livelihood. Land is the most important input for agricultural production and used to be abundant because of sparse population in the continent. The increase in agricultural production had been accomplished by expanding arable land by cutting forest and opening bushes until recently.⁴⁴ Due to the rapid population growth rate in the area (2.5 percent per year) and the limitation of land frontier, however, land has become a scarce resource (Otsuka and Place, 2001). Consequently, improvement in land productivity became the only way to boost agricultural production in parts of Africa. Nonetheless, land productivity in the areas has remained low for several decades mainly because of low adoption and application of technologies for intensive farming methods including high-yielding crop varieties, chemical fertilizers, improved agricultural practices, and new high-value crops.

Low agricultural productivity with land scarcity is not only the issue in rural areas but also has a large negative impact on urban areas through migration of rural poor to urban slums. Many large cities in Sub-Saharan countries have massive inflow of rural poor population into urban areas not because of industrial sectors absorbing workforces but often because of rural poverty. Severity of rural poverty due to low productivity with land scarcity pushes the rural poor to urban areas. Therefore, agricultural productivity has to be enhanced to improve the welfare of the people in the continent.

Technology adoption is the key to realize large improvements in agricultural productivity as happened in Asia in the late 1960s, due to the green revolution, which was nothing more than the application of new technologies (or new seed varieties) in agriculture (Hayami and Ruttan, 1985, Otsuka and Runge, 2011). Given the low current application of these technologies in Africa, there seems to be ample room for small-scale farmers in Sub-Saharan Africa to substantially increase their productivity by adopting new technologies. Despite the presence of large-scale public interventions encouraging farmers to use productivity-enhancing technologies, however, their

⁴³ World Bank (2011).

⁴⁴ World Bank (2008).

adoption has been slow and incomplete; hence, agricultural productivity in Africa has been stagnant for several decades.⁴⁵

Poor infrastructure erodes profit from the technology adoption. Low profitability due to high transportation and transaction cost was a major reason why the dissemination of some promising agricultural technologies was slow and incomplete in Africa. One of the most noticeable changes on the continent is the development of mobile phone networks. For instance, our rural household panel survey shows that, in 2012, 93 percent of Kenyan rural farmers owned at least one mobile phone, while only 13 percent owned a mobile phone in 2004.⁴⁶ Another distinguishable change has occurred in the road network. Road network is still very poor in most Sub-Saharan countries but has been improving steadily in some countries. The GIS road map data for Kenya shows that the travel time by a vehicle from the community center of our survey villages to the nearest large town has been reduced by 20 percent on average between 2004 and 2012. Even though the continent as a whole appears to be moving slowly, major changes are occurring inside.

Some empirical studies show that responding to recent improvement of transportation and communication infrastructure, commodity and input markets have been integrated and hence price dispersion across markets has been declined to a large extent (Aker, 2010). Other studies (e.g. Muto and Yamano, 2009) show that, especially in areas that experienced drastic changes in infrastructure, farmers respond to improved market conditions by applying more fertilizers, adopting high-yielding technologies and choosing high-value crops. These studies suggest that there is a large potential for smallholder agriculture to improve its productivity and profitability along with the development of transportation and communication infrastructure.

Basic infrastructure is a necessary condition for economic development. Improvement of road network density and quality reduces transportation cost. Improvement of mobile phone network enables traders and farmers to have better access to information. The reduction of transportation and transaction cost enhances business opportunity and promotes business activities by private sectors. The cost of agricultural inputs required for the intensive farming is reduced due to the improvement of road networks. Farmers have more market channels to sell their products by having access to market information. It also enables farmers to find markets to sell high value products. Indeed, high-yielding crop varieties, chemical fertilizers, horticultural crops, improved dairy animals, soil conservation practices, small-scale irrigation system, and greenhouses have been adopted in some farming areas already.

This chapter reviews recent empirical studies in Sub-Saharan African countries during the time of massive changes in the continent to derive the implications of the changes for agricultural policies. I review empirical microeconomics studies on agricultural markets, technology adoption, and infrastructure, including mobile networks as well as road infrastructure. I also examine findings from the RePEAT household panel survey

⁴⁵ Morris, Kelly, Kopicki, and Byerlee (2007) provide a comprehensive review of public interventions geared toward the promotion of fertilizer use in Sub-Sahara Africa, as well as the consequences thereof.

⁴⁶ Data source is the RePEAT household survey done by a research team in National Graduate Institute for Policy Studies (GRIPS). It mainly covers rural households in Western, Central, Rift Valley in Kenya.

project which has been tracking over 2000 households in three Eastern African countries, namely, Kenya, Uganda, and Ethiopia since 2003⁴⁷

Recent empirical economics studies particularly in micro oriented studies have paid special attention to the identification of causal impacts in order to generate effective policies. The method of randomized control trials has been used heavily to measure causal effects since since early 2000s. “Poor Economics” by Banarjee and Duflo (2011) and “More Than Good Intentions” by Karlan (2011) introduce this method to a general audience. The main advantage of use the randomized control trial methodology is its power to identify a causal impact.⁴⁸ As long as the method is properly applied, it can identify causal impacts of development programs accurately.

Causal effects have also been measured using data from longitudinal surveys which track same samples through different time points to permit analysis that can eliminate the influence of individual specific factors on the outcome of interest. The RePEAT survey project is in this line, and aims to identify constraints to poverty reduction in the eastern African countries through analyses of longitudinal data from smallholder agriculture.⁴⁹ Data from randomized experiments or longitudinal surveys can provide stronger evidence on performance of smallholder agriculture than before. I review studies that have used these approaches and discuss their implications for effective policies.

8.2 Transportation infrastructure: road network

Generally rural roads in Africa are not passable during rainy seasons and have potholes that damage vehicles as well as crops. It is easily understood that transportation cost is very high in rural areas. The poor market access increases input prices and reduces the effective selling prices of farm produce. Thus, poor roads discourage farmers from buying productivity-enhancing inputs, from producing perishable but high-value products, and from participating in a market economy.⁵⁰

Suppose rural roads were to be improved, would the reverse happen? We expect that due to reduction in transportation costs, farmers would have better access to markets, would buy agricultural inputs at cheaper prices, and would sell their crops at more favorable prices. Remarkably, little formal evidence exists on the household level benefits of improving rural roads infrastructure in Africa (Stifel and Minten, 2008). In particular, there are few household level studies on this issue in Sub-Saharan countries.

⁴⁷ RePEAT stands for Research on Poverty, Environment, and Agricultural Technology and also implies the survey tracks the same households repeatedly to construct a household level longitudinal data. Table 9.1 shows the history of surveys conducted under the RePEAT project by country.

⁴⁸ There has been controversy and criticism on the effectiveness of randomized control trials on identification of causal relationship in the field of development studies (e.g. Angus Deaton, 2012).

⁴⁹ See <http://www3.grips.ac.jp/~globalcoe/j/index.html> for details of the survey project.

⁵⁰ de Janvry et al. (1991), Goetz (1992), Jayne (1994),

One of the reasons for this is that the required data are hard to collect. In particular, household data combined with road data are needed for at least two different points of time.

Our recent study, Matsumoto and Kiprono (2013) using the Kenyan RePEAT household data combined with the GIS map covering the target sample at each point of time from 2004 to 2012, provides evidence on economic effects of improving rural roads. The road quality is measured by two time distance variables, one of which is travel time to the nearest market and the other is travel time to the nearest major town; both are constructed using the GIS road map for Kenya. The GIS road map data in Kenya shows that travel time by a vehicle from the community center of each of the 94 villages in our survey to the nearest major town has been reduced by 20 percent on average since 2004. It also reveals that households experienced a shortening of the travel time from 2004 and 2012. Moreover, they increased their hybrid share of maize seeds, in addition to increasing production and sales of fresh milk. The study confirms that better road access encourages farmers to adopt high-yielding varieties and to choose high-value products. Moreover, the shortening of travel time between 2004 and 2012 was greater in remote areas, implying that the increase in hybrid seed adoption and milk production was higher in those areas.

Similar studies done in Asian countries also show a large, positive impacts of road infrastructure on rural residents. For instance, Khandker et al. (2006) use a similar method as ours to analyze household-level panel data collected by Bangladesh Institute of Development Studies (BIDS). They find that investment in road rehabilitation reduces poverty significantly through higher agricultural production, higher wages, lower input and transportation cost, and higher output prices. They further found that these benefits are skewed towards the poor. A similar conclusion was arrived by Mu and van de Walle (2011) who assessed the impacts of rural road rehabilitation on markets and institutional development in rural Vietnam. Their results showed heterogeneous impacts on the development of local markets, with poorer communities benefiting more due to lower levels of initial market development.

Poor infrastructure increases market power of intermediaries, such as commodity traders who drive around the rural areas buying agricultural products at farm gates and then sell them to vendors or in towns at considerably higher prices. When farmers do not have alternative options to sell their produce or to obtain market price information, the intermediaries extract maximum rent from farmers. In addition, the improvement of transportation infrastructure integrates local markets and reduces volatility of price of agricultural products. Given lack of insurance and credit market, price risk discourages farmers from adopting technologies. However, the empirical evidence on this issue is weak.

8.3 Communication infrastructure: mobile phone network

The number of mobile phone subscriptions in sub-Saharan Africa rose from 16 million in 2000 to 209 million in 2012. This subscription covers 44 percent of the population of this area (475 million).⁵¹ Even among rural areas, where most villages have no access

⁵¹ Source: GSMA report on November 13, 2012. These figures potentially overestimate

to electricity, a rapid increase in coverage has been occurring. The RePEAT data show that, in Kenya, 93 percent of farmers in 2012 own at least one mobile, while only 13 percent owned a phone in 2004. In Uganda, 54 percent of farmers in 2009 owned a mobile phone while only 4 percent owned one in 2003. The rapid speed of dissemination of the mobile phone is proof of large benefits associated with this technology. Mobile phones increase access to information about markets and other technologies. The mobile phone-based services, particularly mobile money, have the potential to enormously improve livelihoods in Africa.⁵²

It is also worth emphasizing that the road network has a synergistic effect with the mobile phone network because information obtained through mobile phones can enhance efficiency of transportation. Traders and even farmers can collect price information from several markets before they actually visit them. Given the current mobile phone network coverage, construction or rehabilitation of rural roads that physically connect multiple locations has a bigger impact today, on agricultural production, for example, than would have been the case in the past when mobile network coverage was limited. Significant improvements in the availability of imobile network over the past decade has significantly changed the communication environments that rural farmers in Africa face.

There is no surprise that environmental changes can cause substantial changes in farmers' choices and behaviors and in the farming activity itself. Recent studies in Sub-Saharan Africa suggest such changes.

The expansion of mobile network coverage in Uganda brought about better market channels for small-scale banana growers and enhanced sales opportunity for perishable products. Using the Ugandan RePEAT survey data, Muto and Yamano (2011) show that information flow due to mobile phone network expansions reduced marketing costs of agricultural commodities. After the expansion of coverage, the authors report increased sales of banana in remote communities but not of maize. The mobile phone coverage expansion seems to induce market participation by farmers in remote areas who produce perishable crops.

Development of mobile phone network in Africa has integrated local markets and reduced price volatility of agricultural commodities. When transportation cost is high, local markets are separated and independent and hence price is determined at each local market according to demand and supply condition of each. When transportation cost declines, several local markets will be integrated not physically but as an economic system, where the price is determined by the aggregate demand and supply of the system. Consequently, price becomes stable because a temporary shock in a particular local market is averaged out over the whole system. Aker (2010) shows that the introduction of mobile phone service explains a 10 to 16 percent reduction in grain price dispersion across regions in Niger in early 2000s. The effect is stronger for market pairs with higher transport costs.

the actual number of mobile phone users, because many individuals own several handsets or have multiple subscriber identity module (SIM) cards.

⁵² Aker and Mbiti (2010) review the literature on the issue of mobile phone network and discuss its potential.

Table 8.1 GRIPS RePEAT Project

Country	Year	Collaborators	Sample size		Regions covered
			Community	Household	
Uganda	2003	Makerere University	94	940	Eastern, Central, Western
	2005	Makerere University	94	894	Eastern, Central, Western
	2009	Makerere University	94	909 (+460)*	Eastern, Central, Western
	2013	Makerere University	94	866	Eastern, Central, Western
Kenya	2004	ICRAF and Tegemeo Institute	99	899	Eastern, Central, Rift-Valley, Nyanza, Western
	2007	Tegemeo Institute	76	773	Central, Rift-Valley, Nyanza, Western
	2009	Tegemeo Institute	35	295	Rift-Valley, Nyanza
	2012	Tegemeo Institute	99	837	Eastern, Central, Rift-Valley, Nyanza, Western
Ethiopia	2004	ILRI	100	420	Amhara, Oromia, SNNP
	2007	ETPSA	42	408	Amhara, Oromia, SNNP

* In addition to the original 909 target households, household interviews for 460 neighbor households were conducted.

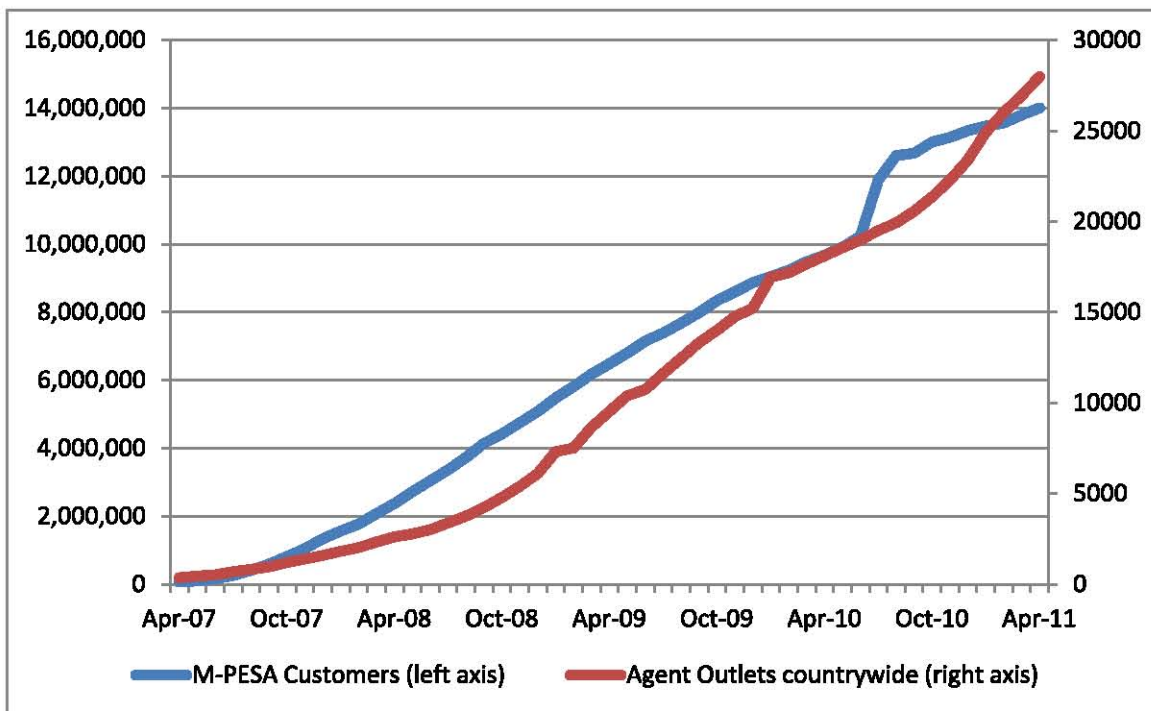
A mobile phone is not only a communication tool but also a device with potential to receive and transmit phone-based services. The most promising service that has already had a large impact in parts of Sub-Saharan Africa is the money service. It is an SMS-based money transfer service that allows individuals to deposit, send, and withdraw funds using their mobile phones. A leading mobile money service in the continent and probably the world's most prevalent service is the *M-pesa* (mobile money) in Kenya that has been provided by Safaricom, a mobile network company, since 2007.⁵³ *M-pesa* is commonly and equally used by rural and urban residents to receive and send remittances. This new method is reliable and immediate and has changed remittance patterns in terms of frequency and timing. The most recent RePEAT Kenya 2012 data show that receipts of remittances were more frequent than those reported in the previous survey. Also, the timing of receiving remittances was concentrated on December (Christmas season) in the previous RePEAT surveys but less concentrated in the 2012 survey. These observations suggest that remittances are made according to family needs. Suri and Jack (2011) found, from a comparison between *M-pesa* users and non-users in their consumption data before and after negative events (including job loss, death of livestock, or harvest problem), that *M-pesa* users managed negative shocks better than non-users. The users were often able to

⁵³ Jack and Suri (2009) describe details about *M-Pesa* and related services.

fully absorb the shocks while non-users experienced consumption fall by 6-10 percent on average. M-pesa appears to increase the efficiency and effectiveness of informal insurance network among family members.

Since M-Pesa provides a platform for any financial service, its potential for welfare improvements is enormous. Some pilot projects providing new phone-based types of financial services for rural residents have already started. For instance, a crop micro-insurance called “*Kilimo Salama*” (good farming) using M-pesa, provides a crop insurance service by selling insured agricultural inputs to small-scale farmers via local input dealers whose cost will be reimbursed by M-pesa to farmers in case of drought or excess rain. M-pesa. “*M-Kesho*” (tomorrow’s money) offered by Equity Bank and Safaricom partnership is a banking service providing a M-pesa based savings account, credit, and insurance. Similarly, a partnership between Safaricom and Commercial Bank of Africa offers

Figure 8.1. Change in the number of M-Pesa (Mobile-money) Customers and Agent Outlets in Kenya



M-Shwari (cool money) to cover immediate loan needs. As individuals develop financial histories with mobile money, the ability to provide credit can expand because financial institutions will be able to analyze those histories and assign credit scores.⁵⁴ Since there is no alternative service available especially in rural areas, the M-pesa financial

⁵⁴ Donovan (2012) discusses the benefits and potential impact of mobile money and related services.

services may have a large impact. There is need to follow up these projects and evaluate their social and economic impacts.

8.4 Technology Adoption

There is little doubt that there exist profitable agricultural technologies suitable to conditions in Sub-Saharan African countries. The recent improvement of transportation and information infrastructure has created a better environment for farmers to have access to market and technologies. Many studies confirm the high average return of agricultural inputs or technologies, for example, fertilizers for maize production in Kenya (Duflo, Kremer, and Robinson, 2008) and hybrid seeds in Kenya (Suri, 2011), fertilizers for cocoa production in Ghana (Zeitlin, Caria, Dzene, Janský, Opoku, and Teal, 2011), New Rice for Africa (NERICA) in Uganda (Kijima, Otsuka, and Sserunkuuma, 2006), and the system of rice intensification (SRI) method for rice production in Madagascar (Moser and Barret, 2006). Nonetheless, such technologies tend to diffuse slowly and incompletely. This observation constitutes a puzzle in Africa, in light of low rate of adoption of technologies that offer the promise of high returns (Suri, 2011).

Some of the recent studies have shown that productivity enhancing-technologies seem not to always lead to positive profit in the area for various reasons. Matsumoto and Yamano (2009) suggest that relative price of fertilizer to maize was too high for the average Ugandan farmers to make profit from the use of fertilizer. Nkonya, Pender, Kaizzi, Kato, and Mugarura (2005) report that the use of inorganic fertilizer appears not to be profitable for most farmers, based on the results of their farm household survey. Suri (2011) argues, in her study of maize production that covers most of the maize-growing areas in Kenya, that the low adoption rate of modern inputs can be accounted for by the heterogeneity of returns to modern inputs.⁵⁵ Zeitlin, Caria, Dzene, Janský, Opoku, and Teal (2011) also report that the high average effect of modern inputs on cocoa production among Ghanaian farmers was found to be consistent with negative economic profits, for a substantial fraction of the farmers who were provided a package of fertilizer and other inputs on credit. These observations imply that the profitability of technologies differs largely across regions and time depending on the market conditions (input price and out price). It also varies by individuals depending on their knowledge on proper use of technologies, the soil quality of their plots; hence some farmers do not consistently use productivity-enhancing technologies.

Matsumoto, Yamano, and Sserunkuuma (2012) have been conducting a series of experimental interventions in maize production in Uganda since 2009 to investigate impacts of technology adoption and diffusion on small-scale farmers. The interventions were sequential and their first stage was a randomized controlled trial. The target sites and individuals were the sample villages and households surveyed for the RePEAT panel study. In the first stage of the intervention in February and March 2009, prior to the first cropping season, the project distributed free maize inputs to the RePEAT

⁵⁵ Duflo, Kremer, and Robinson (2008) also found that the returns of inorganic fertilizer in maize production varied across farmers in western Kenya.

households (called treatment households) who resided in villages randomly chosen from the RePEAT villages and did not do so for other RePEAT households (called control households) in the villages which were not chosen. The free inputs distributed to the treatment households comprised hybrid seed, base fertilizer, and top-dressing fertilizer for growing a quarter acre of maize. In addition, a two-hour training session on the use of the modern inputs was given by an extension worker to the free input recipients.

The second stage of the intervention was the sales workshop held in each of the target villages in August and September 2009. In the sales workshop, the project team actually sold the same inputs as the inputs distributed for free to a subset of the target farmers. In the sales workshop, the project invited the RePEAT households as well as randomly selected neighbors of the recipients of free inputs (called the neighbor households hereafter). The purpose of the sales experiment was to gather information on input demand for the participating households and to make comparison across the three groups—the treatment, control, and neighbor households.

The sales workshop was organized for the project team to collect information on quantities of the three types of inputs that each of the farmers intended to purchase at three different discount levels with and without the credit option available. The results of the sales workshop showed that the distribution of modern agricultural inputs had a positive effect on their adoption by farmers who had little experience in their use.⁵⁶ The intervention had a spillover effect on the neighbors' adoption, too. We also found a large impact of the credit intervention, which suggests that farmers would substantially increase the use of inputs if credit were offered. The impact of credit was largest among treatment households who obtained the free trial packages in the previous season because of the acquired knowledge on usage and profitability of the modern inputs through the intervention.

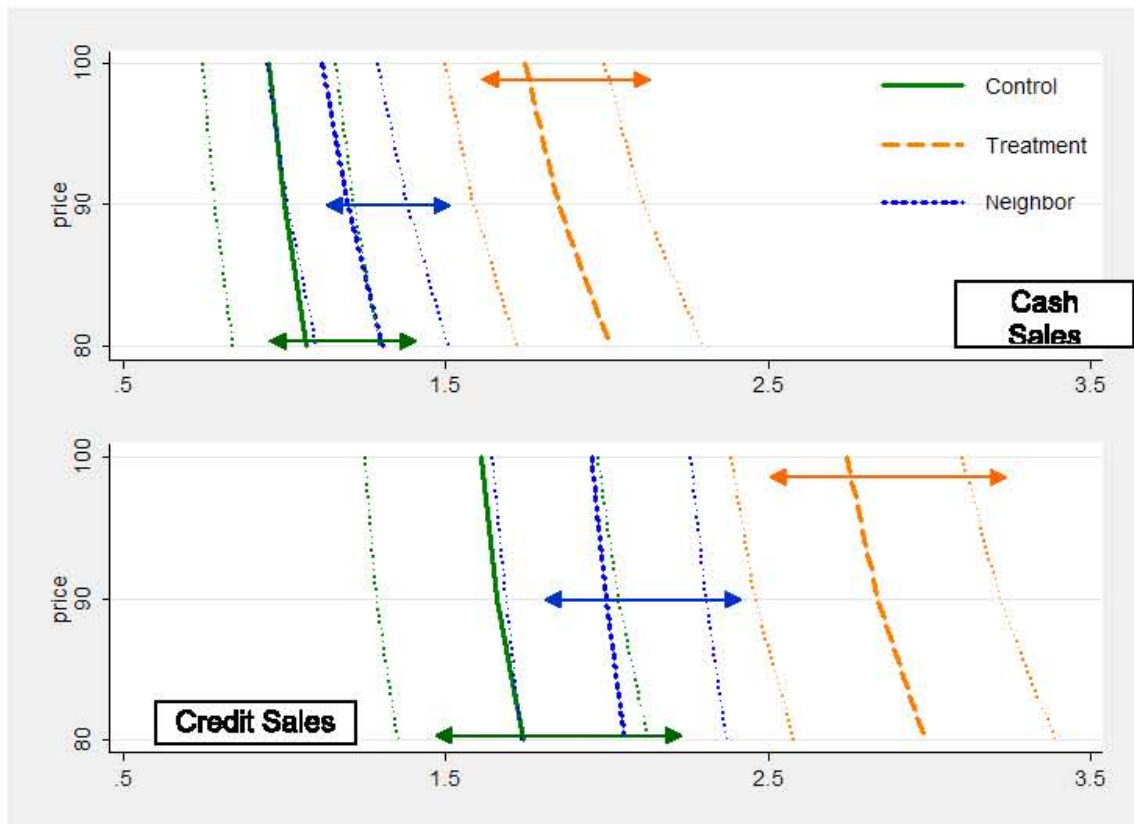
Moreover, further investigation revealed that there was a large heterogeneity in the performance of the trial plots across the treatment households. There were some individuals whose yield gains from use of modern inputs was not large enough to cover the cost of inputs although the inputs brought a positive profit for many farmers. The heterogeneity in performance of the inputs in the trial plots enabled us to examine the farmers' learning process about the modern inputs. Within the treatment households, the recognition of the performance or productivity of the modern inputs, which was measured by the difference between the actual yield of the trial plot and the hypothetical yield by the traditional production predicted by farmers themselves, positively affected their purchase quantities. The successful experience increased the farmers' purchase quantities of the modern inputs for the subsequent season.

Within the neighbor households, their purchase quantities were affected not by the average yield of the trial plot of the treatment households who were geographically nearby but by the average yield of those with whom the neighbor household regularly

⁵⁶ Figure 8.2 shows the average purchase quantities of the hybrid seed at the sales experiment by household type. The vertical axis represents the price index of the hybrid seed. The market price is set at 100. The average purchase quantity of the hybrid seed by the treatment households is the highest, that by the control households is the lowest, and that by the neighbor households fall in-between. We observed the very similar tendency for the base and top-dressing fertilizers, too.

shared the information on farming practices. This finding suggests that farmers learn new agricultural technologies through social networks and adopt such technologies when they recognize the benefits associated with the technologies.

Figure 8.2 Estimated demand curves for hybrid seed by household type
Mean purchase quantities at the sales experiment



8.5 High value agricultural products

Along with the development of transportation and information infrastructure, new market opportunities have been emerging in Sub-Saharan African countries. The rapid growth of export and production of horticultural commodities such as fruits, vegetables, and flowers has been reported in some of Sub-Saharan countries. Kenya is one of the most successful countries in this sector. Kenyan horticultural exports have grown at over 6 percent per year for the past 30 years (Minot and Ngigi, 2004). Whereas Kenya has been known as the largest producer of cut flowers in Africa, flower production by small scale farmers is relatively new and not well known by researchers and policy makers. In order to fill the gap, we conducted a small scale flower producers' survey in Kenya in 2011/2012. I want to share some interesting information obtained from the survey.

Most of small scale flower producers are members of local farmers groups which are formed by member themselves who share the interest in flower or other horticultural products. The final markets of their products are mostly abroad, in particular, Netherland. The farmers typically sell their flowers at their farm gates to brokers who are intermediary agents selling flowers to exporters or directly to exporters at the collection points where their products are graded. In many case, however, farmer groups do not have access to many alternative buyers. Among 39 active groups we visited, 20 farmers groups sell their flowers exclusively to a particular buyer. Many farmers are concerned with marketing of their products. Since flowers are perishable and unable to be stored for long, there are cases in which harvested flowers are spoiled because buyers did not come or did not buy all the harvested flowers. Also, some farmers were often offered very cheap prices by buyers. It can happen when buyers enjoy their monopolistic power because of the farmers' weak bargaining power due to very limited number of options for sales. According to the survey data, each producer sells his/her products to 1.5 buyers on average (See the 2nd last row of Table H2)???. More than 60 percent of producers have only a single buyer. In contrast, some groups in the areas where farmers have a relatively long history of flower production have access to more than 10 buyers. It seems that since farmers in the areas have a relatively longer experience in producing flowers, they have established many market channels.

Farmers groups also have an option to export their products to Dutch markets using export agents in Nairobi rather than selling their flowers to brokers or exporters. The Netherlands is the world center of flower market and there are huge auction sites in which suppliers easily find buyers from all over the world. Once suppliers get the license to sell flowers in the auction sites by satisfying certain conditions and completing the registration, they are able to sell flowers in the sites. Thus, even farmers groups themselves can be such suppliers to find buyers through auction in the sites. However, it seems not to be easy for many farmers groups to export flowers by themselves and make a profit sustainably. Indeed, only three groups out of 39 groups currently producing flowers export flowers by themselves. Major possible constraints for farmers groups to start exporting their products by themselves are 1) lack of knowledge, 2) risks that they have to bear, and 3) quantity requirement in order to make a positive profit. It is easy to imagine that, for most farmers, it is challenging and cumbersome to deal with documentations required starting export. Even if they successfully start exporting, because they have to pay freight cost, agent fees, and other transaction cost before prices of flowers are determined in the Dutch auctions, there is no guarantee that they get better profit than the case in which they just sell flowers to brokers and exporters. In addition, there is a minimum quantity requirement for airfreight. In many cases, especially small farmers groups are not able to collect the minimum quantity from the members and hence cannot export to make profit. It seems that collective action across groups may be needed to overcome the situation.

Main channels of getting to know new varieties are through exporters or other farmers groups. Social network of members of farmer groups seems to play an important role in disseminating useful information. The size of area allocated to flower production and the number of small-scale producers are growing in the areas where buyers come regularly to buy theirs products.

The lessons from the small-scale flower producers' survey in Kenya are summarized as follows. 1) In the case of non-traditional high-value agricultural products, finding buyers or markets is the most important condition for farmers to make sustainable

profits. 2) Information on new buyers and flower varieties is obtained through social networks. 3) Association of farmers sharing the same interests can play an important role in sharing information on production and marketing and also in procurement of inputs. 4) The government can facilitate linkages between farmers groups to exchange their information on production and marketing through workshops and trainings and also linkages between farmers groups and buyers to match stakeholders.

8.6 Conclusions

Although there are many challenges for Sub-Sahara African countries to reach the path to sustainable economic development of rural small scale farmers, recent drastic changes in their environment will push their traditional farming towards intensive farming and bring about a rise in productivity. How successfully they can overcome the challenges in the transition depends on government policies and their effects on market performance. Several concluding remarks are in order.

1. Public policy should put special emphasis on the improvement of basic infrastructure. The improvement of road networks in terms of their density as well as quality has a significant impact on agricultural productivity and farming itself through reduction of input cost and improvement of output price, adoption of agricultural inputs, choice of high-value crops, access to favorable market channels, and investment in land and agricultural equipment. Transportation infrastructure is complement with information infrastructure. Given widespread dissemination of mobile phone networks, the impact of the improvement of the road networks is expected to be even higher than in the past. Road infrastructure improvement combined with mobile phone networks enhances business opportunities for farmers as well as input suppliers and output dealers. Also, local markets integration would be progressed and realize lower price volatility over time and price dispersion across regions, which makes farmers' adoption decision easier due to the reduction of price risks.

But of course, improvement of infrastructure is not a sufficient condition for economic development. Under bad policies of the country or region, the effect of infrastructure investment on economic growth is weakened. Infrastructure investment is often used as an instrument of political leaders to boost their popularity among residents of their constituency and allocated based on not high demand areas but political interests, that weakens the effectiveness of the investment.

Also, infrastructural project may not be the only tool for political leaders to win political games. Even when that is the case, they can be a prey for corruption by government officials. Construction and provision of infrastructure services can be very inefficient and costly if administrative capabilities are limited.⁵⁷ There is no need to stress the importance of transparency and accountability in public financial management.

⁵⁷ Olken (2007) found village elite-capture of the fund for road construction projects in Indonesia. The prevention scheme was the advance announcement of a possibility of a sudden visit by government officials to project site. Reinikka and Svensson (2011) studied the Uganda school fund transfer from the central government to local government and from local government to schools. They found a huge leakage through

2. At the early stage of technology dissemination, lack of knowledge is a crucial determinant of the low adoption rate of profitable technologies. Once farmers recognize the benefit of new inputs for crop production, many of them invest in the inputs in subsequent seasons. It is also important to note that farmers learn from successful experience of others through the social networks. These observations imply the importance of agricultural extension services to diffuse new profitable technologies. Emphasizing the role of extension services, it is obviously important to note that because the profitability of a technology varies across regions and over time, depending on market conditions, an untailored technology does not bring the profit to every farmer. Suitability of technologies differs according to local conditions, and should therefore be recommended by those who have good knowledge on both technologies and local markets. In particular, local private, farm input suppliers who deal with tailored technologies, might be more suitable as extension agents than public officials.

3. Because of the development of mobile technologies and major reductions in transaction costs for communication and financial services via the mobile phones, financial services targeting small scale farmers in remote areas are now feasible, at least technically. The potential to provide such services to small-scale farmers in Africa is great. Indeed, several pilot projects in this area are already under way. We need rigorous empirical evaluations of these pilots to determine whether the financial services they offer to farmers can be replicated on a large scale.

4. Small-scale farmers can be organized into groups to enable them share information on production and marketing as well as on input procurement and crop sales. The government can facilitate linkages between various groups and between farmers and buyers by supporting meetings and contacts among them.

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