

## **Urbanization, Diet Change, and Transformation of the Downstream and Midstream of the Agrifood System: Effects on the Poor in Africa and Asia**

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**Abstract:** *In Africa and Asia, agrifood markets are important to the poor, and current rapid changes in these markets have implications for the poor. First, as a share of the national market, urban markets have gone from marginal some decades ago to dominant today. Thus the urban market is a main food product market the poor face as sellers. Second, the poor are exposed to the product market often as net buyers of products (both from local sources but also increasingly from urban sources of processed foods and fresh products re-“exported” from urban to rural markets). Third, the poor are also very exposed to labor markets as sellers of labor—both to*

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*the rural nonfarm and the urban labor markets. Fourth, the product market has transformed from mainly a grain market some decades ago to a market diversified beyond staples into fruits, vegetables, meat, fish, dairy, edible oils. There is a chance for the poor to gain from this shift toward higher-value non-staples as farmers, and as workers since the employment multipliers are high from non-grains. Fifth, agrifood markets are also transforming structurally. Supply chains are getting geographically longer with urbanization, and developing (with a proliferation of SMEs in the early stages) and consolidating (with the emergence of supermarkets and large processors in the more advanced stages). This may lower food costs for the urban poor and increase the scope and volume of the urban market for rural suppliers. In sum, urbanization, diet change, and food system transformation all offer opportunities for the poor as suppliers of labor and products and sellers of labor. But accessing these opportunities requires “threshold investments” in human, physical or locational assets by the poor to seize these opportunities. The requirements can be geographic (hence geographic poverty traps) and micro (skills, productive assets). JEL Codes: 012, 013, Q12, Q13. Keywords: agrifood markets, food system, farm households, urbanization, poverty, rural suppliers.*

### 1 Introduction

Africa and Asia are living a period of rapid transformation of their agrifood systems. These systems encompass the set of value chains from inputs to farming to post-farmgate segments including processing and distribution. Reardon and Timmer (2014) note that the transformation of the agrifood system is integrated into a set of five simultaneous and inter-linked transformations: (1) rapid urbanization; (2) diet change into foods “beyond grains”; (3) restructuring of the midstream and downstream segments of the agrifood system; (4) intensification of farming; (5) development of rural factor markets and agricultural services. They note that urbanization and diet change stimulate the demand-side forces pulling the whole set of transformations, while factor market and farm technology change power the upstream supply-side forces feeding the rest of the changes, and the agrifood system’s midstream and downstream segments link farm supply and consumer demand.

Each of the above inter-linked trends is a knife-edge for the poor. Each is an opportunity as each offers the chance to build the poor’s in-

come or increase its resilience. Each offers the chance to improve the diet of the poor. Each poses a challenge because each translates into a set of needed investments and thus assets by any household or firm that wants to grasp the opportunity. By extension, each offers the occasion for exclusion due to inability to make the requisite investments to participate.

Beside the above integrative work (Reardon and Timmer), there has been recent and incipient literature in Africa and Asia analyzing the individual transformations. Examples include Christiaensen and Todo's (2014) work on urbanization in Africa, Pingali's (2006) work on diet change in Asia and Tschirley *et al.* (2015) on Africa, Minten and Reardon's work on transforming supply chains in Asia (Reardon *et al.* 2012, 2014), Rao *et al.* (2012) work on effects of downstream change in supply chains in Africa, Pray and Nagarajan's (2014) work on input sector change in Asia, Haggblade *et al.* (2007a,b) work on rural nonfarm labor market change in the two regions, and many papers on farm technology intensification especially in Asia (starting from the Green Revolution period in the 1970s and 1980s) and emerging in Africa.

However, the literature lacks a systematic conceptual and empirical treatment of how this set of five transformations is affecting the poor. This "general equilibrium" perspective on the effects of change on the poor is particularly important in the current period where all five transformations are happening quickly in both regions. Moreover, with some exceptions there has been only an incipient and limited literature on the effects on the poor of the "downstream and midstream" transformation, and even of the upstream "contextual" change of the transformation of factor markets. Much more common has been research on the relation of asset poverty and intensification-technology adoption, such as of new seeds or fertilizer or tube-well irrigation. The latter literature is an extension into the 1990s and 2000s of an established literature from the 1960s to the 1980s on the diffusion of the Green Revolution and its effects on the poor from the supply and demand perspectives.

The purpose of this paper is to set out a conceptual framework, issues, and hypotheses to examine the effects on the poor of this transformation. The paper proceeds as follows. We partially reprise the above transformations, focusing on the downstream and midstream transformations. For space reasons we do not go into upstream transformations as shocks or context affecting the poor. We then present a framework for analyzing the effects of the downstream and midstream transformations

of the agrifood system on the rural poor. We then present hypotheses concerning how they might be affecting them as suppliers and consumers. We conclude with potential policy implications of the hypotheses and conclude with a research agenda.

## **2 Main Trends in Urbanization, Diet Diversification, and Transformation of the Midstream and Downstream Segments of the Agrifood System**

### **2.1 Urbanization and diet change**

Domestic markets constitute around 90 percent of food markets in the regions; exports are very minor (around 5–10 percent of food output) (see, for example, Diao and Hazell, 2004). The domestic markets are urbanizing rapidly. Already the urban share of the total domestic market on average in these regions ranges from about 50 to 70 percent of the value of marketed food, and 40 to 60 percent of the total food (marketed plus home consumption). Compare that with the urban population share ranges from about 30 to 50 percent. (The ranges we note at the lower end are Eastern/Southern Africa and India versus the higher end, West Africa and Southeast Asia.) (Reardon *et al.*, 2014 for Asia; Tschirley *et al.*, 2013 for Africa).

A corollary of the above point is that the majority of the non-staples market is in urban areas, and is growing faster there than in rural areas. While rural diets are changing in Asia and Africa in the ways that Bennett's Law predicts (disproportionate rise of non-staples in the diet as incomes rise), the change is happening faster in urban areas. A typical example in Southeast Asia is that 75 percent of the fruit in Indonesia goes to urban consumers, although the share of urban areas in total population is about 50 percent (Reardon *et al.*, 2014). Analysis of LSMS food expenditure data from four countries in Eastern/Southern Africa reveals urban areas have 58 percent of meat/fish consumption (home consumption plus purchased-market) and 63 percent of the purchased-market; the shares for fruits and vegetables are 52 percent and 63 percent respectively, and 46 and 61 percent for cereals (Dolislager *et al.*, 2014). We surmise the urban shares of the food market could be even higher in West Africa given the urban share of the population is 50 percent compared with the 30 percent in East/Southern Africa. That the majority of the non-staple market is in urban areas is partly because urban incomes

average 2–4 times higher than rural incomes in the two regions. But it can also be, controlling for income, because non-staples experience less seasonal fluctuation and (controlling for availability) sell at lower prices in urban areas.

There is a spatiality of production of fresh and processed food relative to the cities. Fruit and vegetable, aquaculture fish and poultry and milk production tend to be relatively close to cities, focused on these huge agglomerated sources of demand accessible at lower transaction costs than scattered villages. Processing firms, at least second-stage processing (processing into final form for consumption, such as bread), tend to agglomerate in towns and cities and have their densest distribution networks in towns and cities.

Cities draw food supplies from a geographically very large market-shed; this decreases the seasonality of perishables in cities relative to rural areas. Das Gupta *et al.* (2010) have shown how the rapid diffusion of cold storages increased potato availability in Delhi; Minten *et al.*, (2014) show the same for the poor state Bihar in India.

## **2.2 Downstream and midstream agrifood value chain (VC) transformation**

VC modernization (of downstream and midstream) is the process already noted in the introduction as the lengthening of the supply chains, disintermediation over their segments, consolidation per segment, and institutional and organizational change (such as the development of standards and contracts) between firms in different segments. This process has occurred gradually in several stages as detailed by Reardon *et al.* (2009) and summarized below.

In the first stage, public investment induces consolidation and expansion especially of the midstream segments (public wholesale markets mainly in the 1970s–2000s and processing cum distribution parastatals in the 1970s–1990s) and some retail parastatals such as the Public Distribution System “Fair Price Shops” in India. In the second stage, private investment typically drives transformation: After Structural Adjustment Programs cum trade and FDI system liberalization, ensuing private investment induced: (1) first a proliferation of SMEs in the downstream and midstream segments (in different year sets in different places but roughly 1980s–1990s in “first wave Asia” and 1990s–2000s in the rest of Southeast Asia, South Asia, and the 2000’s in Africa); (2) then a consol-

idation per segment from FDI first in the processing sector then in the retail sector with the rise of supermarkets (at different rates over the sub-regions); this was mainly in the 1990s but especially the 2000s in all the regions, although supermarket development is still incipient in Africa, with rapid growth but from a low base.

VC modernization occurred in domestic markets in three product category waves: (1) first in processed foods like processed grains, edible oils; (2) second in semi-processed foods like meats, dairy; (3) third in fresh fruits and vegetables. Note that the first two categories constitute around 85 percent of food consumed in Africa and Asia.

The above stages of change in downstream/midstream segments of VCs themselves occurred at different rates over space. In general, transformation occurred in Asia first, and earlier in Southeast Asia than in South Asia, and then in Africa where it occurred earlier in Southern Africa and Kenya than elsewhere. Within regions, transformation occurred earliest and fastest within countries with earlier market liberalization policies and take-off of income growth and urbanization. Moreover, the transformation has taken off first in large cities, then in secondary cities, then in rural towns. Hence, most of the downstream/midstream transformation overlaps with urbanization itself; the exceptions (in the domestic food economy) are rural town wholesale markets (found more in Asia after the large cities had been “saturated” with wholesale market coverage) and first-stage processing facilities (which render a raw product into a form usable in second-stage processing, like converting wheat to flour as the first stage, and flour to bread in the second stage). The same two step diffusion took place in retail (with supermarkets penetrating first in large cities and then only recently with proliferation of adapted formats into rural towns; examples are the retail chains in rural towns in South Africa and Indonesia).

In both the midstream and downstream segments, parallel to and symbiotic with the above changes in the value chains, firms are beginning modernize their procurement systems—by: (1) centralizing their buying (such as via distribution centers and national, regional, and global buying networks), (2) disintermediating (by buying directly from upstream producers) or re-intermediating (by buying via specialized, dedicated wholesalers); (3) vertically coordinating their suppliers (where they did not vertically integrate), in use of private standards and contracts. These changes allowed reduction of transaction costs for the firm (controlling

for the stage in the product cycle, that is, whether commodity or quality-differentiated niche product), as well as imposition of attributes on the products and services supplied by upstream firms and farms.

### **3 How Do the Transformations Affect the Poor as Suppliers and Consumers?**

#### **3.1 Framework for analysis of the impacts**

Two broad sets of literature provide us with the needed conceptual framework to analyze poverty impacts of the trends above.

There is already a trod path, “linkage analysis,” from the Green Revolution era for analysis of technological shocks on the poor as farmers, laborers, and consumers—taking as given/revealed which sub-set of the population are the initial adopters. Mellor and Lele (1972) analyzed the impact of the introduction of Green Revolution “new seeds”; they noted that the impact of a technology change (which they start by noting is adopted by the upper tier of farmers, who are in turn the upper half of the rural income distribution given the importance of the landless in the 1970s in India) depends on: (a) “consumption linkages,” the expenditure “increments” pattern derived from the marketed surplus revenue increments earned by the adopters of the technology; (b) “production linkages,” the investment (cum output) increments pattern upstream and downstream from the farm (or in whichever segment a new technology is adopted) derived from increments to output in the technology adopting segment; (c) employment linkages, the employment increments both directly in the segment of the adopted technology—and indirectly in the sectors whose output increments from consumption and production linkages.

However, while the linkages approach is useful for empirically estimating value added and employment multipliers resulting from technology shocks (or any shock, such as increase in demand for a product, or reduction of transaction costs, and so on), it does not examine the microeconomics of which suppliers (of the product or labor) adopt the technology or benefit directly from the initial shock (who are directly “included”). Indeed, as the agricultural transformation proceeds, agriculture’s share of the labor force falls sharply, from around 80 percent to around 20 percent of employment. Which 20 percent have the managerial and agronomic skills to remain in an increasingly high-value commercial

agriculture? How do the remaining 60 percent transition from part-time farming into increasingly full-time nonfarm work (Chapoto *et al.*, 2013)?

Several lines of literature provide a conceptual framework (and estimation methods) to examine the microeconomics of inclusion versus exclusion. There is a rich literature in analysis of adoption of new technologies and products (Feder *et al.*, 1985) and diffusion of technologies (Griliches, 1957; Rogers, 1962). The essence of the adoption models is to model adoption as a function of various incentive and capacity variables, micro and meso (that is, individual and collective assets). The literature includes an array of assets, including human capital, land capital, and other non-land assets such as irrigation, as determinants of adoption, and explicitly or implicitly identifies which types of households are included or excluded. The labor supply literature is just an analog to and a subset of the factor demand/supply functions that are also the essence of the technology adoption literature.

A subset of the above literature explicitly models “threshold investments” or critical minimum asset levels for households or individuals to use a technology (e.g., for fertilizer adoption case see David and Barker, 1978) or enter a market (e.g., see Boughton *et al.*, 2007). There are a number of variants of this, including combining risk and thresholds (Carey and Zilberman, 2002), distinguishing “welfare poverty” from “investment poverty” vis soil conservation and other environmental investments (Reardon and Vosti, 1995), and adapting the “poverty trap” concept (Azariadis and Stachurski, 2004) to persistent poverty among agricultural households in developing countries (Carter and Barrett, 2006) or to “geographic poverty traps” (Jalan and Ravallion, 2002). These concepts have been applied to studying inclusion and exclusion from markets in the context of rapid market transformation; this includes research on choice of market channels and participation in contract farming. (See Reardon *et al.*, 2009 and Barrett *et al.*, 2012 for reviews of the literature on these).

This concludes the conceptual framework and now we move to presentation of the hypotheses.

### **3.2 Hypotheses about effects on the poor as suppliers of labor, farm, and nonfarm products**

Diet change toward non-staples per se presents an opportunity for the poor to sharply raise incomes. This can occur via several paths. First,

small farmers can shift from sole reliance on basic grains to (also) producing non-staples which typically have a much higher return per labor day or hectare than basic grains, often five to ten times higher (Chapoto *et al.*, 2013).

Second, the sales of the non-staples may indirectly benefit basic grain productivity of the poor through investment effects and increased availability of working capital to finance farm inputs; this is analogous to the argument of von Braun *et al.* (1989) showing that non-traditional (vegetable) export production by small farmers redounded to the benefit of their grain productivity. The higher payoff market also induces farmers to make soil conservation investments with much higher probability than just producing basic subsistence grains (see Byiringiro and Reardon [1996] for the case of Rwanda).

Third, the poor can find employment as wage workers on farms producing non-staples and in processing plants preparing them for local or export markets. Horticulture and aquaculture and dairy typically (at least in the phase before capital intensification) have higher labor/output ratios than grains. As the latter are easier to mechanize, that sharpens the gap between grains and non-grains on the employment intensity side. There are many examples of wage work “booms” in horticulture/non-traditional export zones in for example Africa (Maertens and Swinnen, 2009) and in the labor demand from peri-urban horticulture (see Neven *et al.*, 2009 on the hired labor demand of emerging “middle class” farmers around Nairobi).

Fourth, some 50–70 percent of the value added in non-grain products is post-farmgate. Non-grain production tends to generate substantial production-linkage employment locally in RNFE linked to the off-farm components of the value chain, in assembly marketing, packing plants, cold storages, and transport. Grains also generate employment but mechanization and consolidation tends to happen earlier and more broadly in grain handling and processing (see work on this in India, Bangladesh, and China in Reardon *et al.*, 2012).

Urbanization facilitates the above rise of the non-grain economy and thus magnifies the above potential benefits to the poor through four pathways.

First, even just in the first stage of market transformation, characterized by public investment in wholesale markets and wet-markets in urban areas, urbanization (controlling for the distance of the poor from

the city market) reduces transaction costs to reach large numbers of consumers. The urban market agglomerates (spatially) demand (via urban wholesale markets and urban retail systems); the alternative market for the poor supplier is selling non-staples to many scattered villages at high transaction cost. The urban market also represents a spectrum of consumer types (by incomes and tastes) thus allowing product differentiation, and moving up the value ladder (and along the product cycle from local niche to bulk commodities to differentiated quality products); this allows the potential capture of price premiums for quality. The latter two reasons are why the peri-urban and near-urban belt around cities (within 1 to 6 hours from cities) has most of the non-grain production in Asia (apart from export enclaves or extensive livestock operations); we surmise this is the same in Africa.

Second, the rise of urban markets serves as a fillip to demand for and supply of processed foods (such as UHT milk from urban processors distributed far and wide in rural areas). The processing sector generally demands lower grade produce just after the peak fresh season so increases the market for farmers who can also ship from further from the cities as the purchases are made in bulk then processed either in rural towns/intermediate cities (e.g., processing firms in Machakos, Kenya).

Third, urban centers serve as conduits for fresh products (collected into and redistributed from urban wholesale markets) to the poor in other zones off-season or in areas not producing the product. This serves to improve access to and prices of these products for the poor as consumers in areas supplied by the urban wholesale markets acting as conduits from producing zones. This is especially important in seasons when or areas where these products are not being produced. Examples are fish in Myanmar via Yangon market or in Bangladesh via Dhaka market, or potatoes in China via Beijing market). This is potentially important as the rural poor are often net purchasers of food, as discussed below in the impacts section.

Fourth, urbanization exerts an indirect effect on the poor, as suppliers of labor to the migration labor market. While this tends to be of major importance in debates, migration income is far less important to rural families in general than is local RNFE in these regions (Haggblade *et al.*, 2007b for a cross-region comparison). Moreover, migration remittances, contrary to conventional wisdom, tend to be concentrated among a relatively small set of rural families and in general not the poor (they

were not poor before migration). However, migration remittances feed the stock of investment funds in the migrant sending villages and thus indirectly create work for the poor; typical examples are as unskilled construction crews and transport teams.

Despite these many potential benefits, diet change cum urbanization can likewise pose important challenges and even threats to the poor.

First, the most common “threat” discussed in this regard is that urbanization is serving as a conduit of imported foods. We contend that this is a minor issue in general but attains some importance for particular products. For fruits and vegetables, dairy, meat, and fish, the import share is very small in Africa and Asia; imports generally do not compete with local products and thus do not displace poor suppliers. In Africa, the issue primarily arises for rice imports in West Africa, which is indeed disproportionately via cities, due to preparation costs and opportunity costs of urban households’ time (Reardon, 1993). This also occurs with poultry, where large import volumes compete with local suppliers. It may also be the case that highly processed foods (such as edible oils) have high import shares, though this varies sharply depending on the city.

However, Tschirley *et al.* (2015) show that the share of imported food (primarily rice and wheat) in Africa cities declines slightly as incomes rise especially because of Bennett’s Law. In Asia, the issue can arise from lower cost producers of fruits and vegetables besting local producers in particular markets (such as Natawidjaja *et al.* [2007] show for fruit from China into the Indonesia market).

Second, location poses potentially large challenge for the poor when the poor live far from the urban markets. In that case there may be in the terms of Jalan and Ravallion (1997) be a “geographic poverty trap.” Two points qualify this problem.

On the one hand, this may be less of a problem in Asia compared with Africa due to the higher population density in Asia, with many poor relatively close to cities of different sizes. The poor far from cities tend to be in low population density (and absolute numbers) in mountains and deserts and island archipelagoes; these strongly hinterland areas are a fairly small portion of the overall population. Reardon *et al.* (2012) make the point that in India, China, and Bangladesh (together a large portion of the population of Asia), a substantial portion of the rural population is within “dynamic” and “intermediate” areas within 5–8 hours by road of cities, areas that supply most of the urban food economy.

On the other hand, this may be less of a problem over time as the demographic evidence points to a reduction in concentration over urban areas (with the share of urban population in towns and secondary cities rising relative to those in the mega-cities) in Africa (Tschirley *et al.*, 2013) and Asia (Reardon *et al.*, 2014). This “flatter” urbanization into smaller urban settlements permits greater linkages with local rural areas (Hardoy and Satterthwaite, 1987; Christiansen and Todo, 2014). Compare the cases of Taiwan and South Korea with reference to the pattern of urbanization and infrastructure being more evenly distributed and diffused in Taiwan (versus very concentrated spatially in Korea), thus inducing a relatively even “rural industrialization” in Taiwan, that is, RNFE distributed over space, compared with concentrated poles of development in large urban areas in South Korea.

Third, however, the “transmission” of large-scale urbanization’s effects via highways from city to city, and the rise of intermediate cities “close to” rural areas, can be both a boon and a challenge to the poor in areas hitherto “protected” by high transaction costs. Bhalla (1997) showed that RNFE shifted over time from remote villages to along the highways or “corridors” between the mega-cities of India. Reardon *et al.* (2007) argue that rural towns and intermediate cities are conduits for cheap food and non-food manufactures from cities where processing enterprises enjoy economies of scale, lower cost and more available energy, and wide distribution networks; these then compete with the manufactures of the poor.

Finally, there are specific benefits and challenges presented by VC transformation for the poor as suppliers.

On the one hand, the initial stages of VC transformation only intensify the benefits of urbanization and diet change to the poor. Reardon *et al.* (2009) show that the initial phase of the second stage—the private sector transformation of VCs—primarily features a proliferation of SME opportunities in the phase of labor-intensity and proliferation of SMEs in the post-farmgate segments, which Reardon and Minten call the “Quiet Revolution in agrifood value chains” and illustrate for Asia (Reardon *et al.*, 2012). It is probable that most of Africa and South Asia are still in this phase. This “grass roots investment” improves access to supply chains and thus to urban markets. But in the second phase of the private-sector induced transformation of VCs, challenges or even threats to the poor emerge, as there are/will be consolidation and capital/labor ratio increases in the off-farm segments.

On the other hand, on the supply side, negative impacts are unambiguous on off-farm enterprises, in that there is usually a scale-based inclusion shown in most (still descriptive) studies. This is a serious challenge for SMEs of the poor over time. This is accelerated and magnified by regulations protecting consumers (especially for food safety) and the imposition of private standards of quality and safety. This is magnified in turn as the diets turn to non-staples. These challenges are predictable from understanding the procurement system change noted above.

Moreover, on the supply side, the evidence is mixed in terms of impacts on farms; there is not necessarily an anti-small-farm bias in the transformation, as small farms with the requisite human capital and physical productive capital (at the micro level, such as with irrigation, and at the collective level, with roads, extension, and sometimes organizational capital like cooperatives), can be included and gain in net income terms. Gow and Swinnen (2001) and Minten *et al.* (2009) argue that large firms (such as the processors they study in Central Europe and Africa) can solve “idiosyncratic market failures” of small farmers, such as for access to specialized inputs and extension and credit, so that they can be helped to participate in demanding markets.

### **3.3 Hypotheses about effects on the poor as consumers**

First, many rural households buy food and thus are exposed to changes in domestic food value chains. The literature notes that there are many net buyers of food in rural areas, not just among the landless, but also among small farmers (for India, see Mellor [1976]; for Africa, see Weber *et al.* [1988] and Reardon *et al.* [1988], and this point has been made since in waves of the debate in Africa [see Barrett, 2008]). Recent findings illustrate how far this has gone. In the ESA countries, for example, Dohlager *et al.* (2015) show rural households bought 44 percent (in value terms) of food they consume. In the Reardon *et al.* (2014) study of Bangladesh, Nepal and Indonesia and Vietnam, they found that rural households (overall) bought 73 percent of their food (in value terms). This implies that food value chain transformation and efficiency can be important to the rural poor not just as farmers and labor sellers but as consumers/buyers.

Falling marketing margins and lower prices that emerge as a result of the transformation of VCs benefit the poor as consumers. Reardon *et al.* (2010) review the demand-side evidence and conclude that the rural and

urban poor can benefit from the transformation: the rise of supermarkets and transformation of the midstream segments can reduce retail prices paid for basic staples of grains and vegetables, shown by evidence in Africa and Asia (see Minten and Reardon [2008] and Reardon *et al.* [2010]). This effect is due to efficiency increases in the supply chains induced by the transformation. This can occur in rural towns serving the poor in the surrounding countryside as well (South Africa case, D’Haese and Van Huylenbroeck, 2005). The latter effects can also occur from distribution networks of firms such as Unilever and ITC in India, providing cheap processed foods to rural areas.

Increased reliance on purchased, processed foods, however, may lead to deteriorating nutritional and health status, including a rapidly increasing prevalence of overweight and obesity in urban areas. In part, nutrition problems arise from increased consumption of highly processed foods (Popkin, 2014). Even modest processing results in loss of fiber and key nutrients in refined cereal products. Increased consumption of high-energy, low-fiber fast foods and soft drinks coupled with declining levels of physical activity results in a growing epidemic of overweight urban populations and associated rise of non-communicable diseases such as heart disease and diabetes.

#### **4 Policy Implications**

The most striking point about the five transformations in both regions is that in the zones where they are occurring, they are integrated and powerful and changing a range of market conditions at the same time. We noted a whole range of opportunities and benefits these represent potentially for the poor. To avail of these benefits, the challenges for policy to address are several.

First, the poor face “meso” (at the level of their zone) challenges that policies can address. The poor who are locationally disadvantaged can be caught in a “geographic poverty trap” as these transformations begin and accelerate. The zones near the cities (and the enclave zones far from cities that are linked to export markets) immediately benefit and their investable surpluses grow; modern companies source from these zones and accelerate their transformation. Farm and off-farm enterprises in the favored zones invest and their supply sides transform to take increasing advantage of the urban market and diet change. This spins off

into better and better RNFE and commuting-migration opportunities in those areas.

The richer (zones) then get richer; does this mean the poorer ones get poorer? That question in its wording presupposes that a zone is in a fixed category; but zone types are mutable. For example, both Central and Eastern Uttar Pradesh (UP) in India were both considered backward and “poverty trapped” zones in the 1990s, while Western UP near Delhi was considered favored and dynamic. By the late 2000s, Central UP had joined Western UP as a zone assumed to be dynamic while the government launched “look east” policies to address the remaining “impervious to growth” zones like eastern UP, Bihar, and Orissa. Even Bihar has in the past half-decade showed signs of radically changing its performance status, such as shown in the rapid spread of potato cold storages (Minten *et al.*, 2014). What changed? Zones “switched potential” because of changes in governance and security (Bihar) and public investments in roads and electrification (Central UP). The same rapid shift was found in Bangladesh following market liberalization combined with heavy investment in roads and electrification. Zones like Khulna that were poor and remote in the early 1990s have become aquaculture revolution areas in the 2000s, coming to rival traditional Green Revolution areas like Comilla; Gujarat’s eastern zone had a horticulture revolution with the Jyoti Grid (electrical power) as did western Gujarat with a multi-cropping boom.

The overall lesson in Asia is that zones can transition from unfavored and traditional to dynamic with the appropriate public investments in roads and electrification and infrastructure for the intermediate cities whose growth will itself be fed by the road and electrification investments, combined with favorable policy environments. This may also be generally applicable to Africa, but on average the lower population density and poorer infrastructure mean that the challenge to make the transition to dynamism in zones is a greater challenge in areas farther from emerging cities.

But zones that are deprived of these investments and contain substantial numbers of poor are indeed in a position to be excluded from—or even threatened by—the growth we noted. They will be eschewed as product sources because of transaction costs, sharp seasonality, and risk, not to mention their inability to invest in needed quality and consistency measures to meet the modern market. Reardon *et al.* (2001) noted, in the case

of that paper for the case of RNFE, but this can be applied more generally, that there is a “meso paradox”: the truly hinterland zones indeed have the highest need or incentive for investments to increase RNFE options for the poor in them—but they have the lowest capacity to create and sustain that employment. Moreover, while poles of growth in the form of intermediate cities would help dynamize the hinterland zones, the cost of building infrastructure in the emerging intermediate cities is high (Christiansen and Todo, 2014) and such investment will be a gradual process. In recent times this paradox is exacerbated—the transformations are occurring so fast that developing the hinterland zones requires not just investment “depth” but also flexibility and resilience to keep up with the changes.

Second, the poor face challenges at the micro level that policies can address. This requires helping the poor to overcome the micro asset poverty traps and meet the investment threshold requirements (skills, productive physical assets, and so on) to participate in the transforming markets. This is conditioned by two challenges. On the one hand, the meso challenge above conditions the micro challenge from the supply side: increasing the assets of the poor in dynamic and intermediate zones has (per for example Deichmann *et al.*, 2009) a far greater chance of alleviating poverty than in a hinterland zone without connection to urban markets.

On the other hand, the effectiveness—and the threshold requirement—of provision of assets to the poor is conditioned by the degree of advance of the transformation of the agrifood system. Bolstering a traditional extension program’s reach to the poor in a situation where farmers have just to meet traditional market requirements can be effective, but would not help much where farmers need specialized knowledge and skills and productive assets to meet demanding private standards of supermarkets.

## 5 Research Implications

The literature on agrifood system transformation has proceeded furthest in just describing the trends in the two regions, and analyzing the extent to which the poor have changed their consumption patterns and adopted new farm technologies and undertaken rural nonfarm employment. Even this “descriptive phase” of the work on the transformations is far from complete and has just been recent, as the transformations have emerged rapidly and recently.

Beyond badly needed detailed descriptions of patterns and trends, there is a large gap in survey-based work on estimating the impacts on the poor, especially employment opportunities and real wages (since the rural and urban poor will become increasingly dependent on purchased food in processed forms). As noted in the section above on frameworks of analysis, there are two broad sets of candidates.

The first is linkage analysis to understand the employment, production, and consumption impacts of the changes, and how these affect the poor. It is necessary to field detailed surveys in urban and rural areas to analyze input purchases by farmers, post-farm gate supply chain services supplied per ton of farm product, labor and capital intensity of both the farm technology and the technologies used in the other segments and sectors, and consumption and labor supply propensities to farm and non-farm sectors of all rural farmer and landless strata.

The second is adoption and participation analysis of technology and market channel participation behavior, highlighting the roles of different kinds of assets on inclusion or exclusion of the poor. This work can be both static/ cross sectional, but also dynamic to understand the accumulation and dis-accumulation trajectories of the poor.

Both of these types of analysis can then be used as grist for policy analysis of various shocks such as infrastructure, education, and technology policies.

## **References**

- Azariadis, C., & Stachurski, J.** (2004). Poverty traps. In P. Aghion & S. Durlauf (Eds.), *Handbook of Economic Growth* (pp. 295–384). Amsterdam: Elsevier.
- Barrett, C., Bachke, M., Bellemare, M., Michelson, H., Narayanan, S., & Walker, T.** (2012). Smallholder participation in contract farming: Comparative evidence from five countries. *World Development*, 40(4), 715–730.
- Barrett, C.** (2008). “Smallholder market participation: Concepts and evidence from eastern and southern Africa,” *Food Policy*, 33, 299–317.
- Bhalla, S.** (1997). *The rise and fall of workforce diversification processes in rural India: A regional and sectoral analysis*. (Centre for Economic Studies and Planning, DSA Working Paper.) New Delhi: Jawaharlal Nehru University.

- Boughton, D., Mather, D., Barrett, C., Benfica, R., Abdula, D., Tschirley, D., & Cunguara, B.** (2007). Market participation by rural households in a low-income country: An asset-based approach applied to Mozambique, *Faith & Economics* 50, 64–101.
- Byiringiro, F., & Reardon, T.** (1996). Farm productivity in Rwanda: effects of farm size, erosion, and soil conservation investments. *Agricultural Economics*, 15(2), 127–136.
- Carey, J., & Zilberman, D.** (2002). A model of investment under uncertainty: Modern irrigation technology and emerging markets in water. *American Journal of Agricultural Economics*, 84(1), 171–183.
- Carter, M., & Barrett, C.** (2006). The economics of poverty traps and persistent poverty: An asset-based approach. *Journal of Development Studies*, 42(2), 178–199.
- Chapoto, A., Haggblade, S., Hichaambwa, M., Kabwe, S., Longabaugh, S., Sitko, N., & Tschirley, D.** (2013). Institutional models for accelerating agricultural commercialization: Evidence from post-independence Zambia, 1965–2012. In E. Hillbom & P. Svensson (Eds.), *Agricultural Transformation in Global History Perspective* (pp. 281–310). London: Routledge.
- Christiaensen, L., & Todo, Y.** (2014). Poverty reduction during the rural-urban transformation: The role of the missing middle. *World Development* 63, 43–58.
- Das Gupta, S., Reardon, T., Minten, B., & Singh, S.** (2010). *The transforming potato value chain in India: From a commercialized-agriculture zone (Agra) to Delhi*. Delhi: Report of value chains component of Asian Development Bank RETA (13th) IFPRI project on policies for ensuring food security in South and Southeast Asia.
- David, C., & Barker, R.** (1978). Modern rice varieties and fertilizer consumption. In *Economic Consequences of the New Rice Technology* (pp. 175–212). Los Baños: IRRI.
- Deichmann, U., Shilpi, F., & Vakis, R.** (2009). Urban proximity, agricultural potential and rural non-farm employment: Evidence from Bangladesh. *World Development*, 37(3), 645–660.
- D’Haese, M., & Van Huylenbroeck, G.** (2005). The rise of supermarkets and changing expenditure patterns of poor rural households case study in the Transkei area, South Africa. *Food Policy* 30(1), 97–113.
- Diao, X., & Hazell, P.** (2004). Exploring market opportunities for African smallholders: 2020 Africa Conference Brief 6. Washington, D.C., IFPRI.

- Dolislager, M., Tschirley, D., & Reardon, T.** (2014). *Transforming diets in Africa*. East Lansing: MSU Working Paper. Report for USAID.
- Feder, G., Just, R., & Zilberman, D.** (1985). Adoption of agricultural innovations in developing countries: A survey. *Economic Development and Cultural Change*, 33(2), 255–298.
- Gow, H., & Swinnen, J.** (2001). Private enforcement capital and contract enforcement in transition economies. *American Journal of Agricultural Economics*, 83(3), 686–690.
- Griliches, Z.** (1957). Hybrid corn: An exploration in the economics of technological change. *Econometrica*, 25, 501–522.
- Haggblade, S., Hazell, P., & Dorosh, P.** (2007a). Sectoral growth linkages between agriculture and the rural nonfarm economy. In S. Haggblade, P. Hazell and T. Reardon (Eds.), *Transforming the rural nonfarm economy: Opportunities and threats in the developing world* (pp. 141–182). Baltimore: Johns Hopkins University Press.
- Haggblade, S., Hazell, P., & Reardon, T.** (2007b). *Transforming the rural nonfarm economy: Opportunities and threats in the developing world*. Baltimore: Johns Hopkins University Press.
- Hardoy, J., & Satterthwaite, D. (Eds.).** (1987). *Small and intermediate urban centres: Their role in regional and national development in the Third World*. Nashville: Westview.
- Jalan, J., & Ravallion, M.** (2002). Geographic poverty traps? A micro model of consumption growth in rural China. *Journal of Applied Econometrics*, 17, 329–346.
- Maertens, M., & Swinnen, J.** (2009). Trade, standards and poverty: Evidence from Senegal. *World Development*, 37(1): 161–178.
- Mellor, J.** (1976). *The new economics of growth*. Ithaca, NY: Cornell University Press.
- Mellor, J., & Lele, U.** (1972). *Growth linkages of the new foodgrain technologies*. (Occasional Paper no. 50, USAID-Employment and Income Distribution Project). Ithaca, NY: Cornell University, Department of Agricultural Economics.
- Minten, B., & Reardon, T.** (2008). Food prices, quality, and quality's pricing in supermarkets vs. traditional markets in developing countries. *Review of Agricultural Economics*, 30(3), 480–490.
- Minten, B., Reardon, T., Singh, K., & Sutradhar, R.** (2014). The new and changing roles of cold storages in the potato supply chain in Bihar. *Economic and Political Weekly*, 49(52), 98–108.

- Minten B., Randrianarison, L., & Swinnen, J.** (2009). Global retail chains and poor farmers: Evidence from Madagascar. *World Development*, 37(11), 1728–1741.
- Natawidjaja, R., Reardon, T., & Shetty, S., with T.I. Noor, T. Perdana, E. Rasmikayati, S. Bachri, & R. Hernandez.** (2007). *Horticultural producers and supermarket development in Indonesia*. Indonesia: The World Bank.
- Neven, D., Odera, M., Reardon, T., & Wang, H.** (2009). Kenyan supermarkets and emerging middle-class horticultural farmers, and employment impacts on rural poor. *World Development*, 37(11), 1802–11.
- Pingali, P.** (2006). Westernization of Asian diets and the transformation of food systems: Implications for research and policy. *Food Policy*, 32, 281–298.
- Popkin, B.** (2014). Nutrition, agriculture and the global food system in low and middle income countries. *Food Policy*, 47, 91–96.
- Pray, C., & Nagarajan, L.** (2014). The transformation of the Indian agricultural input industry: Has it increased agricultural R&D? *Agricultural Economics*, 45 supplement, 145–156.
- Rao, E., Brümmer, B., & Qaim, M.** (2012). Farmer participation in supermarket channels, production technology, and efficiency: The case of vegetables in Kenya. *American Journal of Agricultural Economics*, 94(4), 891–912.
- Reardon, T.** (1993). Cereals demand in the Sahel and potential impacts of regional cereals protection. *World Development*, 21(1), 17–35.
- Reardon, T., Barrett, B., Berdegúé, J., & Swinnen, J.** (2009). Agrifood industry transformation and farmers in developing countries. *World Development*, 37(11), 1717–1727.
- Reardon, T., Matlon, P., & Delgado, C.** (1988). Coping with household-level food insecurity in drought-affected areas of Burkina Faso. *World Development*, 16(9), 1065–1074.
- Reardon, T., Berdegúé, J., & Escobar, G.** (2001). Rural nonfarm employment and incomes in Latin America: Overview of issues, patterns, and determinants. *World Development*, 29(3).
- Reardon, T., Chen, K., Minten, B., & Adriano, L.** (2012). *The quiet revolution in staple food value chains in Asia: Enter the dragon, the elephant, and the tiger*. Mandalugong City, Philippines: Asian Development Bank.

- Reardon, T., Henson, S., & Gulati, A.** (2010). Links between supermarkets and food prices, diet diversity and food safety in developing countries. In C. Hawkes, C. Blouin, S. Henson, N. Drager, & L. Dubé (Eds.), *Trade, food, diet and health: Perspectives and policy options* (pp. 111–130). Chichester, UK: Wiley-Blackwell.
- Reardon, T., Stamoulis, K., & Pingali, P.** (2007). Rural nonfarm employment in developing countries in an era of globalization. *Agricultural Economics*, 37(S1), 173–183.
- Reardon, T. & Timmer, P.** (2014). Five inter-linked transformations in the Asian agrifood economy: Food security implications. *Global Food Security*, 3(2), 108–117.
- Reardon, T., Tschirley, D., Dolislager, M., Snyder, S., Hu, C., & White, S.** (2014). *Urbanization, diet change, and transformation of food supply chains in Asia*. East Lansing: USAID Michigan State University Project of the Global Center for Food System Innovation and the Food Security Policy Innovation Lab.
- Reardon, T., & Vosti, S.** (1995). Links between rural poverty and environment in developing countries: Asset categories and investment poverty. *World Development*, 23(9), 1495–1506.
- Rogers, E.** (1962). *The diffusion of innovations*. New York: Praeger.
- Tschirley, D., Reardon, T., Dolislager, M., & Snyder, J.** (2015). The rise of a middle class in urban and rural east and southern Africa: Implications for food system transformation. *Journal of International Development*, 27(5), 628–646.
- Tschirley, D., Reardon, T., Snyder, J., Dolislager, M.** (2013). *Urbanization, diet change, and transformation of food supply chains in Africa*. East Lansing: Report for USAID Michigan State University Project of the Global Center for Food System Innovation and the Food Security Policy Innovation Lab.
- von Braun J., Hotchkiss, D., & Immink, M.** (1989). *Non-traditional export crops in Guatemala: Effects on production, income, and nutrition* (Research Report 73). Washington, DC.: IFPRI.
- Weber, M., Staatz, J., Holtzman, J., Crawford, E., & Bernstein, R.** (1988). Informing food security decisions in Africa: Empirical analysis and policy dialogue. *American Journal of Agricultural Economics*, 70(5), 1044–1052. ■

