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Urban and peri-Urban Agricultural Migration: An Overview from Mumbai Metropolitan Region (MMR), India

Prem Jose Vazhacharickal

Department of Biotechnology, Mar Augusthinose College, Ramapuram-686576, Kerala, India.

Corresponding author: premjosev@gmail.com

ABSTRACT

Urban and peri-urban agriculture provide income generation to urban poor and making the cities more sustainable. In Mumbai Metropolitan Region, UPA activities play a major role in supporting people's life. A wide range of agricultural production systems with maximum utilization of resources can be seen in Mumbai Metropolitan Region (MMR). Migration is an acute issue in MMR and UPA production plays a vital role in supporting migrant people and reducing urban poverty. Marketing of agricultural commodities is very easier inside the MMR with a well connected network of wholesalers, retailers and street venders. With the help of a baseline survey as well secondary data, this paper tries to reveal an overview of UPA production in association with migration. Migration patterns among various UPA production systems were identified and studied. Like all other informal sectors, the role of UPA in supporting migrant people in MMR should be studied in detail to find out its contribution to employment and economic growth.

Keywords: Urban and peri-urban agriculture; Mumbai Metropolitan Region; Migration; Baseline survey

Urbanization and economic developments contribute increase in consumption and waste generation (UNEP, 2006). The sustainability of the environment is often challenged by the rapid growth of urban population and changes in land use pattern (Harris, 1996; Acharya, 2004). Urban and peri-urban agriculture (UPA) can be broadly defined as the production, processing and distribution of foodstuff from crop and animal production, fish, ornamentals and flowers within and around urban areas (Mougeot, 2000). The contribution of urban and peri-urban agriculture (UPA) towards livelihood strategies, waste recycling, better space utilization, employment, income generation and food security of the urban poor especially in developing countries has often been stressed (Ezedinma and Chukuezi, 1999; Ruel *et al.,* 1999; Shiere and Van der Hoek, 2001; Obuobie *et al.,* 2006; Hill

et al., 2007; Sinha, 2009). These production systems inside and periphery of the city reduces the inflow of products, reduces the transportation, storage costs and serve fresh products to urban people (Jansen, 1992; Midmore and Jansen, 2003; Figure 1).

Population explosion and migration of people towards urban area demands more pressure on food, shelter, water and basic necessities (Cohen, 2006). Migration from rural area to urban area is a common phenomenon in developing countries, where people seek for better employment, education, services and financial gain. Transformations in villages, alternative jobs in construction and various industries, poor of productivity of agricultural labors, seeking better job opportunities and climate change are some key factors triggering the decline of farming activities in rural and peri-urban areas in developing countries (Sharma and Bhaduri, 2006; Martin, 2010). The economic developments of a developing country is often characterized by reduction in agricultural labor force and thus lower contribution of agriculture to the GDP of the nation. Finding agricultural labors is difficult in villages of India, but available readily and cheap in Metropolitan regions. In the year 2008, it was estimated that agricultural sector employed 1.4 billion of the world's 3.4 billion workers (Martin, 2010).

A city that attracts business provides jobs for the people, foster talents, attract capital investments, boost productivity and improve the quality of life. It was estimated that the Indian cities generate 70% of the new jobs and 70% of Indian GDP in the year 2030 (McKinsey Global Institute, 2010). Good cities deliver robust economic growth as well as sustainable quality of life (Figure 2). Employment and surging growth in Indian cities drive population to 340 million in year 2008 and could reach 590 million by 2030. Poverty and lack of gainful employment in rural areas drive people to the cities for work and livelihood (Bhowmik, 2000). Five states in India will have more than 50% of urban population including Tamil Nadu, Gujarat, Maharashtra, Karnataka and Punjab by 2030 (McKinsey Global Institute, 2010).

The slum population of Indian cities in the year 2001 was 42.6 million and 11.2 million of the slum population in the country is in the state of Maharashtra (Census 2001). The rapid urbanization in India leads to 'Urbanization of Poverty' characterized with poor provision for housing facility, water, sanitation, health, education and social security (UNDP, 2009).

Substantial increase in migration from northern Indian states to Mumbai increased during 1961 to 2001 which were higher than the migration from own state Maharashtra. The influxes of migrants from rural and regional centers of India, makes the economic growth sustained and consequently makes the MMR one of the fastest growing regions of India (Desai and Yadav, 2007). People migrate to Mumbai for getting better employment, but most of them spend their life in city's

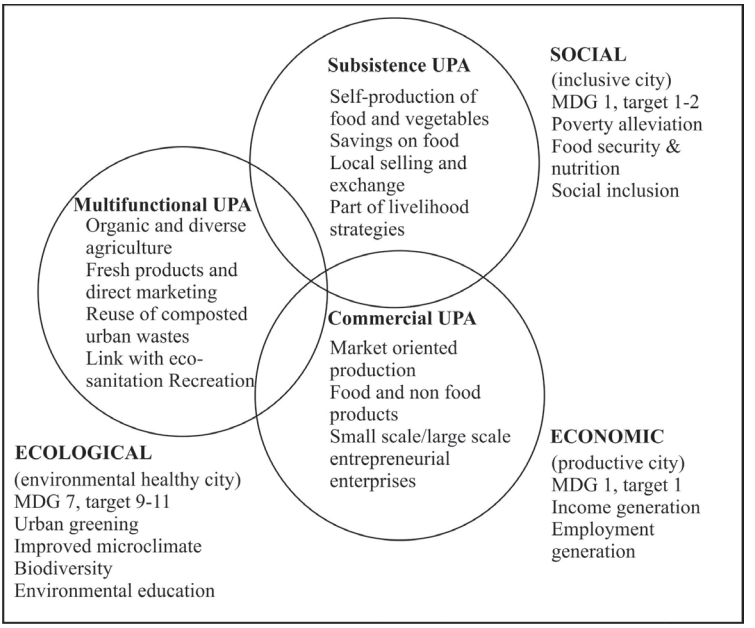

Fig. 1. Dimensions and types of UPA (modified after; Van Veenhuizen and Danso, 2007).

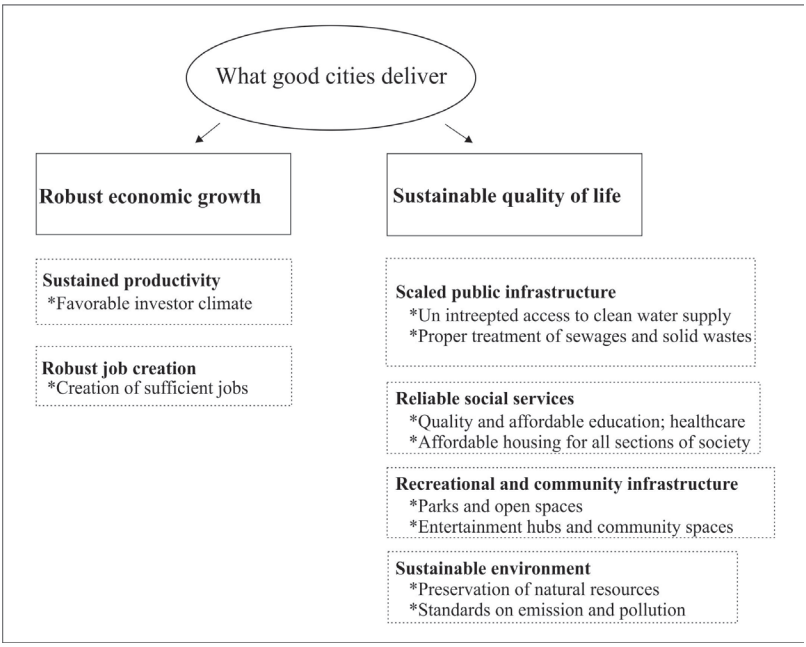

Fig. 2. Ideal cites: Properties and characteristics (modified after; McKinsey Global Institute, 2010).

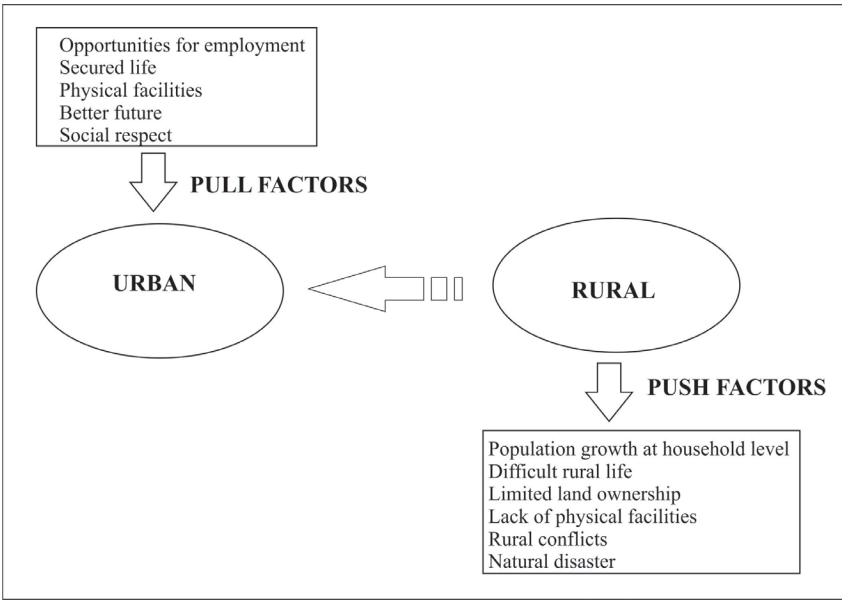

Fig. 3. Push and pull factors for rural-urban migration (Timalsina, 2007).

sprawling slums and get employment only in low paid informal sector, unskilled manufacturing or collecting and selling rubbish (Jen, 2007; Figure 3). Migration and shortage of land due to extreme topography are the main factors for housing crisis in Mumbai (Desai and Yadav, 2007).

In view of the above mentioned aspects, the objectives of this study were: (1) to identify and characterize the various migratory patterns in various UPA production systems across MMR and (2) to determine the link between UPA and migration.

Materials and Methods

Study area

Mumbai (18°53'- 19°04' N 72°48'- 72°53' E), known as the commercial capital of India, is a heavily populated industrial city whose population in 2009 reached 21 millions, thus becoming the fourth largest urban agglomeration in the world (Krishna and Govil, 2005; United Nations, 2010). Mumbai was the first Indian city to experience economical, social and technological changes with the implementation of capitalism in India (Patel, 2007). The MMR longitudinally extents to about 105 km; a deep landward creek of Thane in the southern part (Gudadhe *et al.,* 2012) and consists of 8 Municipal Corporations (Greater Mumbai, Thane, Kalyan-Dombivali, Vasi-Virar, Navi Mumbai, Mira-Bhayandar,

Bhiwandi-Nizampur, Ulhasnagar) and 9 Municipal Councils (Alibag, Ambernath, Karjat, Khopoli, Kulgaon Badlapur, Matheran, Panvel, Pen, Uran) covering an area of 4,355 km^2 with a population density of 4,065 per km^2 (MMRDA, 2010; Table 1) and spread across 4 Districts (Mumbai city, Mumbai sub-urban, Thane and Raigad).

Table 1: Basic statistics on Corporations and Councils in MMR (MMRDA, 2010).

Municipal Corporations				
Name	**Area (sq.km)**	**Population**		
		1981	**1991**	**2001**
Greater Mumbai	468	8,243,400	9,925,890	11,978,450
Kalyan-Dombivali	137	329,870	820,080	1,193,510
Navi-Mumbai	163	96,820	318,440	704,000
Thane	128	431,660	803,380	12,62,550
Ulhasnagar	28	273,660	369,070	473,730
Mira-Bhayandar	89	45,420	175,600	520,380
Vasi-Virar	NA*	11,080	224,430	469,520
Bhiwandi-Nizampur	28	115,280	379,070	598,740
Municipal Councils				
Alibag	2	14,050	16,280	19,490
Ambernath	35	99,650	125,800	203,800
Karjat	8	7,970	19,900	25,530
Khopoli	30	32,100	45,030	58,660
Kulgaon-Badlapur	49	30,770	52,150	97,940
Matheran	7	3,920	4,700	5,130
Panvel	12	37,070	58,980	104,050
Pen	10	14,770	21,580	30,200
Uran	2	15,160	17,770	23,250

*Not Available

The opportunities in Mumbai city is unevenly distributed with differing entitlement to basic amenities like water and sanitation, health care, nutrition and shelter where 60% of the Mumbai's population lives in slum areas (Parasuraman, 2007). About 6 million people in Mumbai estimated to live on less than 1 US$ a day (Jen, 2007). Slum people have no access to basic amenities including water, sanitation and health and these people often occupy overcrowded and polluted environments (McFarlane, 2008).

Economic Importance

Mumbai is considered as the financial, industrial and commercial capital of India which accounts for about 1% of the total population of India (Jadhav, 2005; Table 2). Mumbai contributes about 40% of the GDP of Maharashtra, 4% of national GDP (Prud'homme, 2005) and plays a major role in money market and foreign exchange market transactions. Mumbai is the financial hub of India harboring the Reserve Bank of India, the Bombay Stock Exchange and the National Stock Exchange. Foreign institutional investors and term lending institutions find Mumbai as an "Eden" for investment and 80% of the country's mutual funds are registered in Mumbai (Jadhav, 2005). Mumbai accounts for about one tenth of factory employment and value added manufacturing (Deshpande, 1996) and Brihanmumbai Municipal Corporation (BMC) or Municipal Corporation of Greater Mumbai (MCGM) with a budget more than US$ 1.2 billion exceeding the budget of nine states and union territories in India (Mohan, 2003).

Table 2. Comparison of Mumbai, Maharashtra and India (Jadhav, 2005).

	Mumbai	Maharashtra	India	Share (%; in Maharashtra)	Share (%; in India)
Area (Sq. Km.)	468	3.08 Lakh**	32.87 Lakh**	0.14	0.013
Population* (Million)	11.9	96.8	1027	12.2	1.1
Gross Density (No. of persons per sq. Km.)	20,222	314	324		
Total Regd. working factories (Number)	7,212	28,949	255,837	24.9	2.8
Total workers in factories (Number)	382,700	1,251,759	10,716,000	30.5	3.6

* 2001 Census

** 1Lakh= 0.1 Million

Climatic conditions and land use

Mean annual rainfall in MMR is 2642 mm and mean annual temperature is 26.8 °C (from year 1955-2005; Regional Meteorological Center Mumbai, 2010). Maximum rainfall occurs between June and September mainly due to south west monsoon and

maximum temperature during the months of May and November (Vazhacharickal and Buerkert, 2011). The total agricultural area in MMR is reported to be 2098 km^2 in the year 1971 and got shrink to 1446 km^2 in the year 1991 (Acharya, 2004). Changes in the urbanization and industrialization have doubled the size of built up area and industrial zone in the year 1991 (Vazhacharickal and Buerkert, 2011).

Survey design and data collection

High resolution Google Earth images (Google Inc, California, USA) and land use maps were used to track the area of agricultural production in MMR and these areas were marked with the help of ArcGis software (Esri Inc, California, USA). The marked areas were used as a reference for the identification of gardens in which survey work was conducted.

For the initial baseline survey, semi-structured questionnaires were prepared covering demographic, socio-economic, migratory characteristics and laborer details. A total of 165 interviews were conducted in different regions of MMR (Figure 4) during July 2010 to December 2010, after respondents had been selected using a snowball sampling method. Face to face interviews were conducted with household heads/responsible persons in English, Hindi and Marathi with the assistance of a translator. Locations of the farms/gardens were recorded using Trimble Geoexplorer II (Trimble Navigation Ltd, Sunnyvale, California) and data were transferred using GPS Pathfinder Office software (Trimble Navigation Ltd, Sunnyvale, California).

The baseline survey detected various UPA production systems including railway gardens (RG), balcony gardens (BG), terrace gardens (TG), farms (F), goat keepers (GK), chicken keepers (C) and Tabelas (T) (Vazhacharickal and Buerkert, 2011; Vazhacharickal *et al.,* 2013).

Statistical Analysis

The survey results were analyzed and descriptive statistics were done using SPSS 12.0 (SPSS Inc., an IBM Company, Chicago, USA) and graphs were generated using Sigma plot 7 (Systat Software Inc, Chicago, USA).

Study Approach

The study approach used in this paper was based on primary and secondary data from various resources. Thus, this paper is built on my own data as well as based on literature survey.

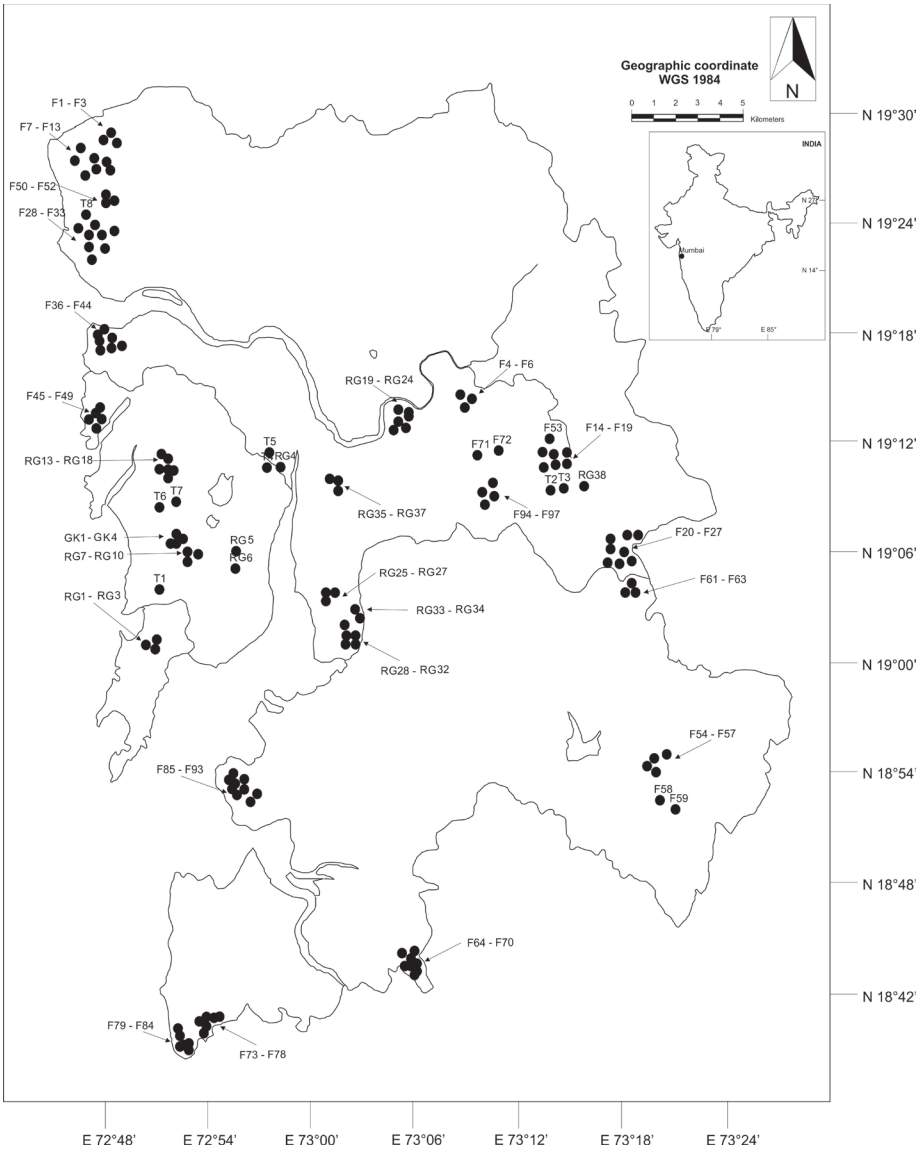

Fig. 4. Map of MMR showing the location of 165 households interviewed in the baseline survey. The dots indicate the position of the households and the respective number in adjacent

Fig. 5. Major urban and peri-urban agricultural related employment in Mumbai Metropolitan Region (MMR): (top left), family selling vegetables; (top right), farmer harvesting spinach; (middle left), farmer washing white radish collected from railway garden; (middle right), sale of ornamental plants in Santacruz near highway in Mumbai University; (bottom left), seasonal migrant workers employed in separating rice grains; (bottom right), migrant worker taking care of buffaloes in Tableas.

Results and Discussion

Scope and Extent of UPA in MMR

Terrace and balcony gardens are highly popular in urban middle and upper class families and were found as a sort of leisure activity for some people. An extensive system of animal dairy production called as Tabelas (meaning stable) which are

common in Greater Mumbai and in the rest of MMR. These production systems are close to highly inhabited areas also characterized by keeping buffaloes and cows which supply the needs of local people.

The Indian Railways is a key player in UPA production in MMR. The unutilized lands near railway tracks and stations are rented out to outside people and railway class IV employees (gang men, gate keepers and khalasis). This scheme was started by the Indian Railways promoting "Grow More Food" especially vegetables. The scheme was also intended to prevent or stop the railway land being encroached by outside slum people (Indian Railways, 2007). Farms outside Greater Mumbai have a size ranging from 0.3 to 20 hectares and most of the farms were characterized by rice cultivation in the rainy season (July-October), vegetables in the winter and summer seasons (November-June) and some intercropping with flowers and fruit trees (Figure 5). Goat keepers, predominantly Muslim population, are located mostly in Greater Mumbai provides animals for their religious rituals. These production systems are mostly extensive with a maximum of 15 heads kept on small areas near the scrap or small shops and they are fed with market wastes and leftovers from the kitchen.

Marketing channels in Mumbai are often well organized and have an established distribution networks consist of wholesalers, retailers, commission agents and street vendors. Urban and peri-urban agriculture production in MMR provides a lot of opportunities to urban poor, slum people and middle class families. The UPA production does generate income not only to farmers but also to local street vendors who reap multiple benefits due to local procurements which help them to sell fresh vegetables in the market.

The recycling of organic waste within the city and supplying the local markets with fresh vegetables, milk, meat and flowers contribute to self-subsistence of the agglomeration and increase of the sustainable use of resources. Government authorities promote urban agriculture and city farming as a tool for decreasing the cost of waste disposal. Community city farming initiatives are gaining much importance in MMR as these can considerably reduce the cost of garbage disposal and allows the maximum utilization of space and resources.

Household Classification

The respondents were asked to classify as themselves poor, medium or rich according to their own perception. Of the total 165 interviews, 75 were poor, 74 medium and 16 rich (45.5%, 44.8% and 9.7% respectively).

Household structure and level of education

The household structure was found to be heterogeneous from the initial baseline survey ranging from 1 to 17. On average, 1 member was children up to 15 years;

4 were 15 to 55 years and 1 was above 55 years. The average number household members (5.2) from the survey were slightly above the average households members in urban MMR which is 5.1 (MMRDA, 2010).

Migration Pattern

Migration was associated across various production systems; in which 70% of the survived households were native to MMR, 6% migrants from Maharashtra state and 24% from rest of India. Out of 38 RG households, 30 (79%) were migrant people from outside Maharashtra states (Figure 6) which is quite a high rate of migration. In F, 90% were native of MMR and acquired their land through ancestral property. The BG and TG were comprised of migrant people outside state 30% and 33% respectively. 38% of the T households were also migrants from outside MMR.

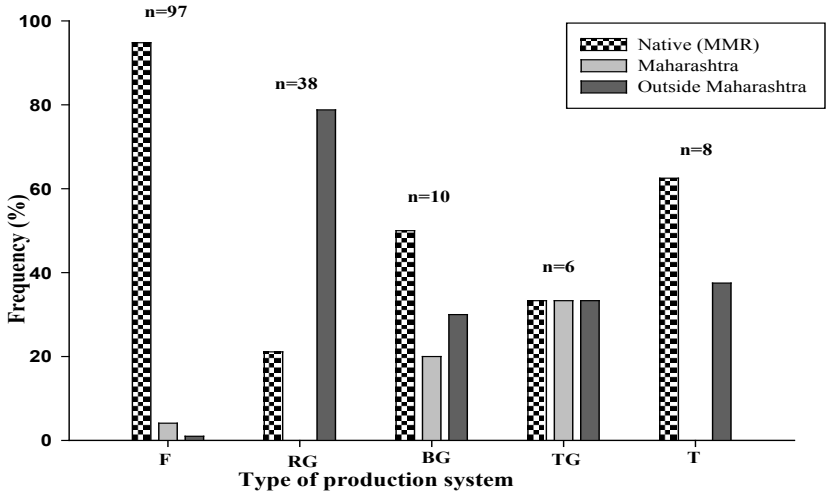

Fig. 6. Percentage of household heads having achieved different educational levels from different production systems across MMR

Seasonal agricultural migration

Agricultural migration in MMR is particularly more during planting and harvesting of paddy. The nature of employment includes all phases in the cultivation beginning with clearing the land for cultivation, planting, weeding, application of insecticides and ends with harvesting the paddy and separating from hay. Handpicked paddy harvest and manual separation of rice grain from hay by beating them to drums or stones still exist in MMR. The peak season for this agricultural labor migration ranges between July to October with a maximum submit in the last month. These

labors are coming from far-off villages with an expectation of higher wages, better accommodation and more job prospects. The wages differ from areas to area within the MMR that is ranging from 60 to 150 Indian Rupees (INR) per day. The daily wages, of male workers are comparatively higher than their female counterpart, which includes food, extra allowance for panparag (chewing tobacco) and liquor. Maximum pay can be seen in north-western area MMR including Virar, Vasi, Arnala and Akashi and less pay in south-eastern part of MMR like Khopoli, Karjat, Alibag and pen.

Migration in Railway garden

UPA production are found throughout both sides of railway tracks of Central, Western and Harbor lines of Indian Railways in MMR. Vacant land near railway tracks and stations have been rented to Railway Class IV employees. These contracts are to be renewed annually. They were also given housing accommodation and protection by the Railway. The Indian Railway started the scheme "Grow More Food" with a motto to produce vegetables near the railway tracks is to meet the daily vegetable needs of the urban people, preventing the railway land being encroached, and provide livelihood strategies and to create employment to migrant people.

The people who have been taken leased land from Indian railways are mainly from Uttar Pradesh (UP) and Madhaya Pradesh (MP). These people stay in tents without electricity and without basic amenities. Most of the farmers stay with their family, in most cases the workers are usually their relatives or from the same village. The railway gardens are characterized by very intensive market based vegetable production with maximum utilization of land and limited natural resources such as water and manure. The rent charged by the Railway authority can vary between 3000 to 6000 INR depending on the size and location of the land.

Migration in Tabelas

"Tabelas" can be seen quite dispersed throughout MMR region. Tabela's herd size range from 30 to 120 buffaloes and also comprise a few heads of cattle. The owners of Tabelas are migrant people from other states. The Tabelas employ lots of migrant people for watching out, cleaning, milking and distribution of milk. Tabelas with a herd size of 40 buffalos gives full time employment for 4 to 6 people daily throughout the year. The wages differ from 120 to 160 INR.

Livestock diversifies the opportunities of urban poor (Guendel, 2002), provides nutrition with improved food security (Shiere and Van der Hoek, 2001) and recycles wastes (Richardson and Whitney, 1995). Tabelas in MMR play a vital role in providing nutrition and food security to urban people. In spite of all these advantages, the key issues associated with livestock

keeping in urban areas include pollution from animal wastes, health hazards to humans, stench, and traffic hazards (Lewcock, 1996; UNDP, 1996).

Migration to permanent agricultural jobs

Migrant people also find permanent jobs in farms and nurseries in MMR. This involves flower pickers, coconut harvesters and daily farm laborers. Most of the people lives near by the farms and get food from the farm. The wages varies from 120 to 200 INR. These people stays with their family and the family members also find local jobs in neighboring areas.

Migration to horticulture

Migrant people also find job opportunities in selling ornamental flower pots and decoration plants. Most of such people find spaces near highways or motor ways. They live in tents, and pots are exhibited adjacent to motor ways/main highways to attract customers. The main advantage of such vendors is that they get clients who comes with vehicles and takes the pot with plants. In addition to these sales, they also take pots in a cycle rickshaw for selling in flats and houses nearby. The people also sell plastic pots, manure, soil and soil supplements. Children also assist in the process by maintaining the pots especially pruning, cleaning the area and irrigation.

Migration for vending agricultural commodities

Street vendor in Mumbai supply essential commodities to people where people can purchase things with easiness. Migrant people also find jobs in street vending activities. They provide local goods especially electronics and cloths at reasonable price. On the other hand, agricultural commodities including fruits, vegetables and flowers were charged 20 to 30% than the wholesale rate. Female vendors play a major role in selling vegetables especially green leafy vegetables and other green herbs which is a daily food ingredient of almost all food dishes in India. They collect commodities from wholesale markets like Kalyan, Vashi and Dadar. After procurement, the commodities are then cleaned and sorted before selling to the customers. The housewives of the farmers also sell their product directly in the streets and the markets. Tender coconut sellers also pay a major role in street vending of agricultural commodities. Fruit and vegetable juice venders are also a part of this network and major juices includes sugarcane (*Saccharum*) juice, carrot (*Daucus carota*) juice, chikoo (*Manilkara zapota*) juice, mango (*Mangifera indica*) juice, lemon (*Citrus x limon*) juice and musambi (*Citrus limetta*) juice. Most of them have opted vending as a solution to reduce poverty and as a livelihood opportunity. According to Bhowmik (2010), a large section of urban street vendors lacks or have low employment skills and migrated from rural areas.

Protest against migration

The Shiv Sena argues that the migration in MMR is the major reason for unemployment and lack of jobs for the local Maharashtrian people (Hansen, 2001). It was estimated that 90,000 huts were destroyed during 2004 and 2005, leaving 350,000 peoples homeless by the protest against immigrant people (McFarlane, 2008). The Shiv Sena argues that Maratians must get job first since this people are native to the land (sons of Maharashtra's soil) and was estimated that nearly 100 to 300 new families migrate to Mumbai each day.

Migration is always a serious concern to researchers, urban planners and policy makers. According to Jadhav (2005), it is very difficult to segregate the two factors of migration (Figure 2), pull migration (people who are drawn to bright futures in the city) and push migration (people who are forced to leave their homes). Migrant people who cannot find job end up with anti-social activities and rag picking or begging (Rani, 2009).

Majority of the people migrating to Mumbai find jobs in informal sectors especially construction works and live in slums with lack of basic amenities (Jen, 2007). The unbalanced urbanization and industrialization process in Asia has resulted in huge migration of people from rural areas to urban areas where people reluctant to take up agricultural employment which is comparatively less attractive in terms of monetary benefits (Charsombut, 1981; Shaw, 2004). The opportunities in other sectors and booming economy also stops people, especially the youth, from taking up jobs in agriculture sector (Sharma and Bhaduri, 2006).

Housing crisis is a major problem in Mumbai and within 25 km from the city center, sea and water bodies occupy 66 percentage of the total area (Bertaud, 2004). In mega cities, the Floor Space Index (FSI) varies from 5 to 15 in Central Business District (CBD) and 0.5 in suburbs. In contrast to this, in Mumbai FSI remain 1.33 for the city and 1.0 in suburbs (Desai, 2007).

Lack of affordable accommodation within the city forces the people to move towards outskirts and travel up to 4 hours each day to get to their place of work (Jen, 2007). Most commuters depend on rail which makes the sub-urban trains in Mumbai overcrowded during peak hours. It was estimated that 6.3 million commuters use daily the sub-urban trains (Mumbai Rail Vikas Corporation Ltd, 2010). The Indian Railways calls this phenomena as Super Dense Crush Load in which 14 to 16 persons occupy per square meter of floor space.

Effective management of solid waste is yet another challenge. BMC spends 6.5 to 7.0 Billions of INR per annum for the waste disposal. 7500 tons of garbage are being generated each day in Greater Mumbai and 40 percentage of these wastes are completely biodegradable (Jadhav, 2005; Davis, 2010). Air pollution load due to combustion of fossil fuels amount to 459 metric tons (MT) per day whereby

an estimated 60 percentage of air pollution is caused by automobile emission (MPCB, 2005).

Urbanization generally lowers the poverty, but some aspects of economic developments and changes linked with the processes of urbanization in India created a negative impact on urban poor community. Such major such issues involves the closing down of textile mills and slum demolition programmes (UNDP, 2009). Urbanization and urban growth creates a mixture of problems involving social and environmental aspects including crime, congestion, pollution, child labor, epidemics and social injustices (World Bank, 2002).

UPA activities provide employment for a lot of people especially the migrant people. The UPA activities can considerably reduce the domestic wastes and make the cities more sustainable and cleaner. It is very easy to find UPA jobs in MMR. The street vending of agricultural products in MMR is very common and requires less capital investment and space. Preference of the buyers especially youth and rich persons from street vendors is already reported by Saha (2009). These UPA activities in MMR can sustainably fill the gaps of unemployment created by the informal sector and provide livelihood strategies for urban poor. UPA could be linked with the microfinance programme which is aimed to empower the urban poor economically and it could be transformed as a key tool to accomplish the Millennium Development Goals (MDGs) of United Nations.

According to Bhowmik (2000), street vendors constitute a large group of urban workforce with an estimate of more than 200,000 street vendors in Mumbai. The Tata Institute of Social Sciences (TISS) and Youth for Unity and Voluntary Action (YUVA) survey found out that majority of vegetables vendors are females with an earning capacity of 35 to 50 INR per day, also facing lot of harassment from authorities. About 15% of the street vendors in Mumbai are migrant people (Bhowmik, 2000) which is also the same scenario in other Indian cities like Hyderabad (Rani, 2009) and Ahmadabad (Patil, 2010).

Conclusion

Rural to urban migration is creating food insecurities in cities and of course the urban poor are worst hit by the global food deficit. UPA production in MMR plays a vital role in making the city sustainable, provides a lot of opportunities to urban poor and as means to recycle the wastages. UPA activities certainly, act as a vital tool in providing income generation provision for migrant people and hence reduce urban poverty. Like all other informal sectors, UPA production should be also studied in depth to discover and exact share and role in supporting migrant people. Since migration is a severe social problem in MMR, UPA activities can substantially reduce poverty and economic deprivation of urban poor particularly slum dwellers.

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