REGIONAL AND SMALL AREA STATISTICS

TEXTBOOK

ORGANISATION OF ISLAMIC COOPERATION

**STATISTICAL ECONOMIC AND SOCIAL RESEARCH
AND TRAINING CENTRE FOR ISLAMIC COUNTRIES**

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REGIONAL AND SMALL AREA STATISTICS

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CONTENTS

ACRONYMS

BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
CBR	Crude Birth Rate
CDR	Crude Death Rate
COFOG	Classification of the Functions of Government
CO2	Carbon dioxide
GDP	Gross Domestic Product
HMSS	Health and Morbidity Status Survey
IMR	Infant Mortality Rate
LFS	Labour Force Survey
NEET	Adults neither employed nor in education or in training
NO2	Nitrogen dioxide
PM10	Particulate matter (concentration of fine particles in the air)
PPP	Purchasing Power Parity
SNG	Sub-National Government
SVRS	Sample Vital Registration System
TFR	Total Fertility Rate
HYV	High Yielding Variety
OECD	Organization for Economic Cooperation and Development

ACKNOWLEDGEMENT

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UNIT 1

MEASURING REGIONAL ECONOMIES

Regional and local data are increasingly available from a variety of sources: surveys, geo-coded data, administrative records, big data, and data produced by users. The range of techniques to integrate and analyse these different sources has also changed the supply of data on different geographical scales, with the potential for dramatically improving both the quantity and timeliness of local information.

The integration of data sources can help governments to better understand interactions among economic, social and environmental changes at the local level. In addition, a rich set of information at different geographical levels responds not only to policy makers' needs but also to people's desire to better understand the area they live in to make decisions, voice their interests, and participate in democratic life. Meeting these expectations will help governments to receive feedback, restore trust and, ultimately, improve the efficacy of their actions.

Measuring regional economies introduces the reader to the way subnational information has developed across a range of topics and different territorial levels. It also sets out a statistical agenda to better respond to the increasing demands of sound local statistics to inform both the political debate and communities wanting to better understand the quality of life of the places they live in.

1.1. What do Regional Data Tell Us?

Traditionally, regional policy analysis has used data collected for administrative regions, that is, the regional boundaries as organised by governments. Such data can provide sound evidence on the contribution of regions to national performance as well as on the persistence of disparities within a country. They show, for example, that during the past 15 years, more than 30% of growth in GDP, employment and population within the OECD is attributable to a small number of regions (OECD, 2013).

They also show that the economic crisis has widened inequalities across regions within countries. Whereas in France and the United States, for example, metropolitan areas have managed to maintain an advantage in terms of GDP and employment creation compared to the

rest of the country, metropolitan areas in Japan or Italy are struggling, due to an ageing labour force or high youth unemployment.

Data on administrative regions can also help us to understand the role of subnational governments in policy planning and public service delivery. OECD subnational governments were responsible for more than 40% of public expenditure and two-thirds of direct public investment in 2012, allocated mainly to economic affairs, education and housing.

1.2. Why a Special Focus on Metropolitan Areas?

Regional policies need to better account for the fact that urbanisation can take many forms and to recognise that these forms have an impact on the type and pace of urban development. The ways people in cities have access to education and jobs, decent housing and efficient transportation, as well as enjoy a safe and sustainable environment, will in turn have a strong impact on national and global prosperity. Moreover, reduced transport and communication costs will continue to make urban areas increasingly interconnected. It is important to better understand the functioning and efficiency of these connections since they represent key links between urbanisation and productivity growth, and they can lead to important changes in how and where production takes place. Key goals of regional policies, such as increased social cohesion, depend critically on how urban areas grow and on how they interact among themselves and with their surrounding areas (OECD, 2013).

Almost half of the population in OECD countries live in metropolitan areas. These 275 metropolitan areas contribute to more than 50% of OECD GDP and account for 60% of patents in the OECD area. By 2050, 6 billion people worldwide are expected to live in cities, a consequence of the continuous expansion of mega-cities in emerging economies and the coming together of people and business in urban centres of different scales in other parts of the world. Even in OECD countries where urbanisation is already high, many metropolitan areas keep growing, and the distribution of people and activities over space continues to change. Such changes may, for example, take the form of evolution from a monocentric urban area to a more polycentric system of integrated urban centres and sub-centres. Evidence shows that different forms of organisation of people and production over space may have important implication for the overall performance of a country (Brezzi and Veneri, 2013).

The 2013 edition of Regions at a Glance presents, for the first time, a new section on the socio-economic, environmental and demographic performance of metropolitan areas in OECD

countries. It uses the OECD Metropolitan Database, which provides a harmonised base for examining cities beyond administrative boundaries and includes estimates of socio-economic indicators (gross domestic product, employment and unemployment) and environmental assets (land use, air quality and green spaces) in metropolitan areas (OECD, 2013).

Metropolitan areas as engines for growth, sustainable development and social inclusion

    i. Seventy per cent of the OECD population live in cities of different sizes, and the metropolitan areas alone account for 50% of OECD population.

    ii. In 16 OECD countries, 65% of all patents were granted in metropolitan areas in 2008.

    iii. The crisis has had an impact on metropolitan areas: the unemployment rate in the metropolitan areas rose more in the last four years than in the previous decade in 26 out of the 28 OECD countries considered.

    iv. Urban sprawl is increasing faster than population growth in many metropolitan areas.

    v. Metropolitan areas are large consumers of energy and producers of CO_2. However, in half of the OECD countries, CO_2 emissions per capita in the metropolitan areas are lower than in less densely populated regions.

1.3. Defining Functional Regions and Functional Urban Areas

Functional regions are geographic areas defined by their economic and social integration rather than by traditional administrative boundaries. A functional region is a self-contained economic unit according to the functional criteria chosen (for example, commuting, water service, or a school district, etc.). In summary, functional regions can trigger a change in the way policies are planned and implemented, better integrating them and adapting them to the local needs (OECD, 2013).

Functional urban areas are here defined as densely populated municipalities (urban cores) and adjacent municipalities with high levels of commuting towards the densely populated urban cores (hinterland). Functional urban areas can extend across administrative boundaries, reflecting the economic geography of where people actually live and work. **Metropolitan areas** are here also defined as functional urban areas (OECD, 2013).

1.4. Availability of subnational statistics

The estimated variables for the metropolitan areas are derived by integrating different sources of data, making use of GIS and adjusting existing regional data to non-administrative boundaries. Two types of methods to obtain estimates at the desired geographical level are applied, both

requiring the use of GIS tools to disaggregate socio-economic data. These techniques are increasingly used today, especially in the field of environmental indicators and for other issues that are particularly attached to the geography of a territory (Nordhaus et al., 2006; Milego and Ramos, 2006; Doll et al., 2000).

The first method makes use of satellite datasets (global layers) at different resolutions, but which are always smaller than the considered regions. The statistics for one region are obtained by superimposing the source data onto regional boundaries. In these cases, the regional value is either the sum or a weighted average of the values observed in the source data within the (approximated) area delimited by the regional boundaries. This method has been applied, for example, to estimate the amount of green space, the share of built-up areas and the changes in land use in metropolitan areas (Piacentini and Rosina, 2012). The integration of geographical information and population data allows a better understanding of urban forms and urbanisation processes. In many OECD metropolitan areas, the pace of growth of the built-up areas has been faster than population growth in the last ten years, and in more than 30% of them this has resulted in an increase in the built-up area "available" to inhabitants, a phenomenon known as urban sprawl.

The second method makes use of GIS tools to adjust or downscale data, available only for larger geographies, to regularly spaced "grids" by using additional data inputs that capture how the phenomenon of interest is distributed across space (Goldring et al., 2005; Milego and Ramos, 2006; OECD, 2012; Panek et al., 2007). In this method the GDP values, employment, unemployment and the carbon emissions of metropolitan areas using the corresponding values for small regions are estimated.

Geographical data combined with socio-economic statistics can also be used to increase the available information for administrative regions. For example, the OECD publication presents measures of air quality and share of forests in large and small regions to compensate for the lack of international standards for statistics of environmental conditions in regions. More generally, the OECD is working to connect information about the people, the society and the economy of a location with the aim of broadening the measures of well-being and societal progress in regions (OECD, 2013).

UNIT 2
SPECIAL FOCUS ON METROPOLITAN AREAS

Metropolitan areas are the prime engine of growth. More than 50% of economic growth and job creation in the OECD area occurred in the 275 metropolitan areas. Nevertheless, inadequate policies and planning can exacerbate inequalities within and across metropolitan areas. The resilience of cities to economic shocks varies widely within and across OECD countries. And now, in 45% of metropolitan areas the unemployment rate is higher than that of the respective country (OECD, 2013).

2.1. Urban Population

The world is urbanising with 70% of the world's population expected to live in urban areas by 2050 (UN, 2009). Today, two-thirds of the OECD population live in urban areas, according to the OECD-EC definition (OECD, 2013).

By adopting an economic concept, functional urban areas have been identified beyond their administrative boundaries in 29 OECD countries. They are characterised by densely populated urban cores and hinterlands with high levels of commuting towards the urban cores. The share of national population in functional urban areas ranges from 87% in Korea to less than 40% in Slovenia and the Slovak Republic.

Among the 1179 OECD functional urban areas, 77 have more than 1.5 million people, 198 between 500000 and 1.5 million people, 406 between 200000 and 500000 people, and 498 are small functional urban areas with a population below 200000 and above 50000 people.

Countries with similar shares of urban population may concentrate population in a few large urban areas or instead distribute in a polycentric system, with many, relatively small, urban areas. For example, around 70% of the national population lives in functional urban areas in Chile and the Netherlands, but 70% of the urban population in Chile lives in cities larger than 500000 population, while in the Netherlands this percentage is 50. The share of urban

population living in relatively small urban areas is higher in European countries than in North America or Asia.

In the last twelve years, the population of the hinterlands has been growing at a faster rate than the population of the core; sub-urbanisation is observed in the hinterlands of large metropolitan areas (with more than 1.5 million people), where the population grew at a rate of 1.6% a year.

Urbanisation in OECD countries has continued in the past decade, reinforcing the trend of OECD populations towards becoming increasingly concentrated in urban areas of different sizes.

2.2. Urbanization and Urban Forms

Metropolitan areas are defined as the functional urban areas (FUA) with population above 500000. The functional urban areas are defined as densely populated municipalities (urban cores) and adjacent municipalities with high levels of commuting towards the densely populated urban cores (hinterland). Functional urban areas can extend across administrative boundaries, reflecting the economic geography of where people actually live and work (OECD, 2013).

The 275 metropolitan areas in OECD countries accounted for 48% of OECD population, 56% of the total gross domestic product (GDP) and 49% of employment in 2010. The concentration of population and GDP ranges from 70% in Japan to less than 30% in the Slovak Republic.

The population in metropolitan areas grew at an average annual rate of 0.9% in the period 2000-2012 (compared to the 0.6% annual growth of the OECD population). Many metropolitan areas in Japan and Germany, as well as a few in Korea and the United States, display negative population growth.

As a result of the different patterns of urbanisation, population density can be very different in metropolitan areas of the same size. In Denver (United States) and Daegu (Korea), each of which has a population of around 2.5 million, population density was 160 and 2250 people per km2, respectively. Or, metropolitan areas of different sizes can display similar urban density, like Tokyo (Japan) and Naples (Italy), where Tokyo's population is 10 times larger than that of Naples.

The form and the quality of urbanisation processes are of concern for policy makers. This is particularly important when the expansion of land for urban uses (residential and commercial buildings, major roads and railways) threatens the quality of the landscape or bio-diversity.

In the past decade, many metropolitan areas have continued increasing their built-up areas, at a pace even faster than population growth. Urban sprawl, here measured as the percentage change in the built-up area "available" per person, was 1% on average in the OECD metropolitan areas between 2000-06. The metropolitan areas in Estonia, Portugal, Ireland and Japan show the highest sprawl among OECD countries.

2.3. Economic Competitiveness of Metropolitan Areas

The 275 OECD metropolitan areas (with populations of at least 500000) contributed on average to over half of the total OECD growth over the period 2000-10. The aggregate GDP growth of metropolitan areas in the period 2000-10, appeared for a large part due to a small number of large metropolitan areas. Indeed, nine metropolitan areas (3.5% of the total) contributed to one-third of the GDP metropolitan growth in the OECD area, while the accumulated contribution of the remaining metropolitan areas was around two-thirds. Seoul-Incheon, New York, Tokyo and London recorded the highest contribution to the GDP growth in the OECD area (OECD, 2013).

The role of metropolitan areas for the national GDP growth can be quite different across OECD countries. Metropolitan areas in Greece, Japan, France and Hungary accounted for more than 70% of the national growth in the period 2000-10. In contrast, in the Netherlands and the Slovak Republic, metropolitan areas accounted for less than 40% of the national growth.

The national capital metropolitan areas in Greece, Chile and Portugal were responsible alone for more than 80% of the GDP growth of metropolitan areas. On the other hand, a larger number of metropolitan areas contributed significantly to the national growth in the United States, Canada, Mexico and Germany.

While the overall economic performance of metropolitan areas was strong in the period 2000-10, some areas are growing fast while others are stagnant or shrinking. Metropolitan areas tend to be wealthier than the rest of the economy. The GDP per capita gap between the metropolitan areas and the rest of the economy in the OECD area was around 40% in 2010. Such a GDP gap is higher in Europe and Americas than in Asia.

2.4. Labour Productivity and Employment in Metropolitan Areas

Metropolitan areas drive national employment creation in many countries. On average, half of overall employment creation in 22 OECD countries between 2000 and 2012 was accounted for by 232 metropolitan areas. The metropolitan contribution to national employment growth was particularly high in Korea and Canada (more than 70%), while metropolitan areas in the Slovak Republic and Italy contributed to less than 35% of national employment growth (OECD, 2013).

Differences in employment growth can be large even among metropolitan areas of the same country. In Mexico, Japan, the United States and Poland, the differences in employment growth among metropolitan areas in each country were as large as 3% in the period 2000-2012.

Metropolitan areas tend to be more productive than other regions due to a larger pool of workers (particularly skilled workers), better infrastructure and connections among firms, factors usually referred as "agglomeration benefits". Among the 20 best performers in productivity growth in the period 2000-10 there were relatively small metropolitan areas, such as Bratislava in the Slovak Republic; fastgrowing areas, such as Prague in the Czech Republic; and metropolitan areas that have gained the most in population, such as Centro in Mexico and Poznan in Poland.

While the metropolitan area of Centro in Mexico displays the highest productivity growth, many other Mexican metropolitan areas were among the cities with the largest decline in productivity, together with metropolitan areas in France and Italy.

2.5. Environmental Sustainability in Metropolitan Areas

Green areas such as parks and natural vegetation contribute to reducing pollution, improving the health and quality of life of residents, and making metropolitan areas more attractive to residents and tourists.

International comparable measures of green areas can be derived by overlapping satellite-based measures of land cover with the metropolitan boundaries. According to these estimates, North American cities such as Edmonton, Des Moines and Madison are the metropolitan areas with the largest share of green area per person (higher than 5000 square metres per person). Juares, Bari, Anjo and Athens, on the other hand, recorded the lowest estimates of green areas, i.e. below the minimum level of 9 square metres per person recommended by the World Health Organization (OECD, 2013).

While metropolitan areas are considered large consumers of energy and producers of carbon dioxide (CO_2), high differences are observable among cities both within and across countries. The metropolitan areas with the highest levels of emissions per capita are found in Canada, Korea and the United States. Within countries, the highest differences in CO_2 emissions per capita in metropolitan areas are observed in Mexico, Italy, Korea and France. Metropolitan areas can also be more energy efficient than the rest of the country. Evidence shows that the CO_2 emissions per capita in the metropolitan areas are lower than in less densely populated regions in half of the OECD countries, where data are available.

Source of CO_2 emissions depends on many factors, including urban form. For the United States, the high levels of CO_2 from the transport sector are the result of a continuous sprawl of cities and the intensive use of private vehicles to commute. On the other hand, in European cities, which account on average for lower levels of CO_2 emissions per capita, the share of CO_2 emissions coming from the energy production sector is relatively larger than the share of emissions coming from the transport sector.

2.6. Administrative Organization of Metropolitan Areas

Metropolitan areas are continuously changing their spatial organisation, reflecting the evolution of economy and society. These changes affect the quality of life, the demand for transport infrastructure, and the global environmental footprint of urbanisation, among other factors. Regional, metropolitan and local governments' decisions depend critically on the physical structure of the city. On average, 80% of the OECD urban population lives in the cores of metropolitan areas and only 20% in the hinterlands, but in a few European countries the share of population in urban cores is below 50%. While most of the metropolitan areas have grown with contiguous urban cores, 30 metropolitan areas show a polycentric structure with more than one urban core (OECD, 2013).

Metropolitan areas are important units for public policy. However, their boundaries do not generally match the administrative ones. The number of local governments inside the boundaries of a metropolitan area gives an indication of possible challenges for efficient and equitable service delivery, policy co-ordination, and distribution of wealth in a city, among others. The average population size by local government in metropolitan areas ranges from 4000 people in the Czech Republic to over 200000 in Ireland, the United Kingdom and Mexico.

The number of local governments per 100000 people – a measure of administrative fragmentation of the metropolitan area – varies from around 25 in the Czech Republic to less than 0.5 in Ireland and the United Kingdom. While on average the number of local governments increases for larger metropolitan areas, the territorial organisation of countries has an important impact: for cities of similar population size the territorial fragmentation can be as different as 33 local governments per 100000 population in Strasbourg (France) to 6 in Cheongju (Korea) and 0.9 in El Paso (United States). Rouen (France) and Brno (Czech Republic) are the OECD metropolitan areas with the highest administrative fragmentation, 49 and 38 local governments per 100 000 inhabitants, respectively.

UNIT 3
REGIONS AS DRIVERS OF NATIONAL COMPETITIVENESS

Regions are at the forefront of governments' efforts to boost growth, improve well-being and tackle inequalities, but the economic crisis has increased the gap in GDP per capita between leading and lagging regions in half of the OECD countries. Although economic growth and other measures of success vary widely among regions, and even within a single country, OECD research shows that underperforming regions can become competitive given the right mix of policies and if efforts are co-ordinated across all levels of government (OECD, 2013).

OECD has established a regional typology to take into account geographical differences and enable meaningful comparisons between regions belonging to the same type. Regions have been classified as predominantly rural, intermediate and predominantly urban on the basis of the percentage of population living in local rural units.

3.1. Distribution of Population and Regional Typology

The geographic distribution of population is explained by differences in climatic and environmental conditions that discourage human settlement in some areas and favour population concentration around a few urban centres. This pattern is reinforced by the increased availability of economic opportunities and wider availability of services stemming from urbanisation itself (OECD, 2013).

In 2012, almost half of the total OECD population (48%) lived in predominantly urban regions, which accounted for 6% of the total area. More than 60% of the population lived in predominantly urban regions in the Netherlands, Belgium, the United Kingdom and Korea.

Predominantly rural regions accounted for one-fourth of total population and more than 80% of land area. In Ireland, Finland, Norway and Slovenia, the share of the national population in rural regions was two times higher than the OECD average.

Rural regions in North America, European countries, and in Japan have been further classified as either close to a large urban centre or remote. Over the 25 OECD countries with rural regions, only in Estonia, Norway, Greece, Portugal Switzerland and Canada does more than half of the rural population live in remote rural regions.

Population is unevenly distributed among regions within OECD countries. In 2012, 10% of regions accounted for 40% of the total population in OECD countries. The concentration of population was highest in Australia, Canada, Iceland and Chile, where more than half of the population lived in 10% of the regions with the largest population.

The regional population density varies from below 5 people per km2 in some regions in Australia, Canada, Chile, Iceland, Mexico and the United States to above 1000 people per km2 in some predominantly urban regions in Europe, Canada, Japan, Korea and Mexico.

3.2. Regional Contribution to Population Change

During the past 20 years, the population in OECD countries grew on average 0.6% per year, reaching 1.2 billion in 2012. According to the OECD classification of small regions, regional population ranges from about 450 inhabitants in Balance ACT (Australia) to more than 23 million in the region of New York-Newark-Bridgeport (United States).

Over the same time period, population growth in emerging economies (Brazil, China, India, the Russian Federation and South Africa) was 0.9% yearly. The largest region, the State of Uttar Pradesh in India, exceeded 204 million people in 2012.

In OECD countries, almost 60% of population growth is accounted for by just 10% of regions which represent one-third of the OECD population. The regional contribution to population growth is particularly concentrated in Canada, Japan, Finland and Korea. Among emerging economies, the concentration of population in a few regions is the highest in the Russian Federation (OECD, 2013).

The share of the population living in predominantly urban regions increased in 23 OECD countries and significantly in Ireland, Turkey, New Zealand, Canada and Finland (more than three percentage points) in the past 17 years. Among the countries which decreased the share of urban population, in Hungary and Estonia intermediate regions have increased their share of

population in recent years, while in the United States, Chile and Poland rural regions have gained in population shares.

In many countries, predominantly rural remote regions displayed a net decrease of population, or smaller population growth, than any other type of region. This was not the case in Ireland and Switzerland where the annual population growth in remote rural regions was higher than that in rural regions close to a city in the period 1995-2012. The share of population in predominantly urban regions exceeded 40% in Brazil and South Africa in 2010. Around 115 million people moved to predominantly urban regions in China in the period 2000-10 (OECD, 2013).

3.3. Regional Contribution to National GDP Growth

Local factors matter in achieving sustained national growth. In fact, 10% of OECD regions were responsible for 38% of OECD gross domestic product (GDP) in 2010. In Greece, the 10% of regions with the highest output contributed half or more of the national GDP. On the other hand, GDP in Denmark, Belgium, the Slovak Republic and the Netherlands was more evenly distributed among regions, with the 10% of regions with the highest output accounting for no more than 25% of total GDP. Similarly, in Colombia, the Russian Federation and Brazil, the contribution to national GDP was regionally very concentrated (OECD, 2013).

Predominantly urban regions attract the largest share of economic activity. In 2010, almost 60% of total GDP in OECD countries was produced in urban regions, and more than 75% of national GDP in Belgium, the Netherlands and the United Kingdom. The difference in concentration between GDP share and population share is particularly high in Hungary, the Slovak Republic, Turkey and Ireland with a difference of more than 15 percentage points. Predominantly rural areas contributed 14% to overall GDP, even though in Ireland and Finland the GDP produced by rural regions was over more than half of national GDP.

Over the period 1995-2010, OECD GDP growth appeared for a large part due to a small number of large regions. However, the largest share still comes from the accumulated contribution of many small regions. Around 3% of regions contributed to one-third of aggregate growth of the OECD area, while the accumulated contribution of the remaining regions was around two-thirds. On average, the top 10% of regions were responsible for 42% of OECD growth. At country level, the regional contribution to growth was very concentrated in Greece, Hungary, Finland, Chile, Sweden, Japan, and the United Kingdom, where the 10% of regions with highest GDP increase were responsible for more than half of the national growth in 1995-2010.

Over the recent period, the economic recession has increased the concentration of GDP growth in fewer regions. During the period 1995-2010 the median value of the yearly GDP growth rate was 1.9% among OECD regions. Differences in regional GDP growth rates between the best and the worst performing regions were the largest in Mexico, with more than 8 percentage points of difference. In Korea, Poland and Germany, regional differences were smaller but still considerable (above 6 percentage points). The Russian Federation, China and India displayed larger regional difference in growth rates compared to OECD countries.

Wide differences in regional growth are not always associated with faster national growth. Ireland, Estonia and the Slovak Republic displayed a national growth rate more than double the OECD average and have limited regional differences.

3.4. Regional Contribution to Change in Employment

During 1999-2012, differences in annual employment growth rates across OECD countries were as large as 3.5 percentage points, ranging from -0.5% in Greece to 3% in Chile. Over the same period, differences in regional employment growth rates across regions were above 3 percentage points in almost half of the countries. Among the OECD countries, the widest differences in regional employment growth rates are found in Mexico, Canada and the United States, and, among the emerging economies, in the Russian Federation (OECD, 2013).

Relatively few regions led national employment creation: on average, 39% of the overall employment growth in OECD countries between 1999 and 2012 was accounted for by just 10% of regions. The regional contribution to national employment creation was particularly pronounced in certain countries. In Hungary, the United States (among OECD countries), the Russian Federation and South Africa, more than 50% of employment growth was spurred by 10% of regions.

In the most recent years, following the economic crisis of 2008, fewer regions concentrated most of the employment creation, while the employment losses became more regionally dispersed as more regions experienced net losses in employment than in the previous years. The regional concentration of employment creation increased in half of the 28 countries, resulting in higher differences in total employment among regions within a country, particularly in the Czech Republic, Hungary, Poland and Slovenia.

3.5. Labour Productivity and GDP Per Capita Growth in Regions

Labour productivity growth is considered a key indicator to assess regional competitiveness and an essential driver of change in living standards. Regional living conditions are raised by continued gains in labour productivity, along with an increase in labour utilisation. In fact, only economies that manage to simultaneously sustain employment and productivity growth will increase their gross domestic product (GDP) per capita and maintain it in the long run (OECD, 2013).

Growth in regional GDP per capita is broken down into the contribution of labour productivity growth (here measured as GDP per worker) and changes in labour utilisation (measured as the ratio between employment at place of work and population).

Among the 20 OECD regions with the highest GDP per capita growth rate during 2000-10, labour productivity growth is a major determinant compared to changes in labour utilisation. In 17 of the 20 regions, labour productivity growth accounted for 70% or more of the rise in GDP per capita. Only the region of Lodzkie (Poland) has an increase of the rate of labour utilization higher than the growth in labour productivity.

Both bad performances in labour productivity and in labour utilisation are, instead, the cause of the regional decline in GDP per capita. The 20 regions with the highest decline in GDP per capita rate during 2000-10 were essentially concentrated in four countries: Italy, France, Spain and the United States. In the Spanish regions (Balearic and Canary Islands) and some of the U.S. states (Georgia, South Carolina and Ohio), the growth in labour productivity was offset by the sharp decline in labour utilisation. On the other hand, the nine Italian regions, the four regions in France and Michigan (United States) have seen a decrease in their productivity while labour utilisation stagnated.

Differences in labour productivity growth among regions are invariably the result of multiple national and local factors, including labour market policies and institutions as well as innovation and the adoption of new technologies. As such, differences in labour productivity growth among OECD regions are larger than among OECD countries.

3.6. Regional Economic Disparities

Regional differences in gross domestic product (GDP) per capita within countries are often larger than among OECD countries. According to the Gini index, the emerging economies –

Indonesia, the Russian Federation, Colombia and Brazil – displayed the greatest disparity in GDP per capita in 2010, with Chile, Mexico, the Slovak Republic and Turkey among the OECD countries. From 1995 to 2010 regional disparities increased in 20 out of 33 countries considered. Significant increases can be found in the Czech Republic, Hungary, Australia, Sweden and Estonia (OECD, 2013).

Economic output differences are largely attributed to disparities in productivity and in the utilisation of the available labour force. Regional differences in labour productivity, here measured by the range in regional GDP per worker, were markedly high in the United Kingdom, Chile, Mexico, Switzerland, Korea and Poland, where some regions displayed productivity twice as high as the national value (five times as high for the Inner London West), and some other regions had values less than half the national value.

The Gini index is a measure of inequality which assigns equal weight to each region of a country regardless of its population size. The number of people living in regions with low GDP per capita (under the national median) can provide an indication of the different economic implications of disparities within a country. For example, while the regional disparities as measured by the Gini index in GDP per capita are of the same magnitude in Chile and Mexico, the percentage of the national population living in regions with low GDP per capita varies from more than half of the population in Mexico to around 30% in Chile.

UNIT 4
SUBNATIONAL FINANCE AND INVESTMENT FOR REGIONAL DEVELOPMENT

The subnational government (SNG) is here defined as the sum of the two subsectors of the general government data:

- Federated government ("states") and related public entities, relevant only for countries having a federal or quasi-federal system of government;
- Local government; i.e. regional and local governments and related public entities.

Regional, local and other subnational governments (SNG) accounted for 40% of public spending in the OECD area in 2012, although figures for different countries vary widely depending on the degree of federalism, regional decentralisation and financial autonomy. SNG are responsible for 72% of direct public investment in the OECD area, and often more in federal countries (Belgium, Canada, Germany, Switzerland and United States) where the total combines investments by the federated states and from local government (OECD, 2013).

4.1. Subnational Finance

Subnational governments (SNG) represent a large share of public spending in most OECD countries. In 2012, SNG expenditure accounted for 17% of GDP and 40% of public spending in the OECD area.

These two figures mask a wide variety of national situations. SNG spending responsibilities may vary according to whether the country is federal or unitary, its size and territorial organisation, the level of decentralisation and the responsibilities of subnational governments over certain sectors. Some countries, such as Canada, Denmark and Switzerland, stand out for the high level of subnational expenditure, while in Greece, New Zealand and Turkey, SNG have more limited competencies (OECD, 2013).

On average, education is the largest spending item for SNG. It represents almost 27% of subnational expenditure in the OECD area and above 36% in Iceland, Slovenia, Estonia and the Slovak Republic. Health is the second highest budget line (18% in the OECD area) and accounts for 47% of subnational government expenditure in Italy. Other large SNG budget items include economic affairs, general public services (both 14%) and social protection (12%).

Tax revenues provide on average 45% of SNG revenues in the OECD area. This share exceeds 60% in Sweden, Spain and Iceland but accounts for less than 10% in the Netherlands, Greece and Mexico. Transfers from central and supranational governments represent the second main source of SNG revenues (38%).

The autonomy of SNG on expenditures and revenues varies from one country to another. It may be steered by central governments or restricted by regulatory and budgetary standards; as such, spending and revenue indicators may not reflect the degree of autonomy in finance decisions of subnational governments.

4.2. Subnational Public Investment

Subnational governments (SNG) have a key role in public investment: SNG direct public investment represented 2% of GDP in the OECD area in 2012 (the direct public investment by all levels of government was around 2.7% of OECD GDP). This share is above 3% in Canada and Korea and less than 1% of GDP in Greece, Austria, Portugal, Iceland and the Slovak Republic (OECD, 2013).

On average, SNG direct public investment accounted for 11.2% of subnational expenditure in the OECD area in 2012. This value ranges from less than 5% in Spain (compared to 13% before 2008), Denmark and Austria to more than 20% in Ireland, Korea, Luxembourg and New Zealand. This ratio is generally higher in the least-decentralised countries where SNGs are key investors, implementing major national investment projects, but have a small role in managing public services.

Moreover, 72% of direct public investment in the OECD area is carried out by SNG (62% when calculated as an unweighted average across countries). This ratio tends to be higher in federal countries (in Canada, Belgium, United States, Germany and Switzerland) where it combines investments by the federated states and from local government. However, in some unitary

countries such as Japan and France, local government investments also represent a major part of public investment.

In 2011, 37% of SNG direct investment in the OECD area was allocated to economic affairs (transport, communications, economic development, energy, construction, etc.) but over 50% in Greece, Austria, Portugal and Poland. Almost one-quarter of SNG direct investment was made in education (48% in the United Kingdom) and 12% in housing and community amenities (around one-third in France, Ireland and the Slovak Republic). Healthcare accounted for 27% of SNG direct investment in Denmark, 23% in Sweden, 18% in Estonia and 17% in Finland. Lastly, the environment (waste, collection and treatment of wastewater, environmental protection, etc.) mobilised more than 20% of local investment in the Czech Republic, Hungary and the Netherlands.

4.3. Subnational Public Debt

The general government gross debt definition here used is based on the System of National Accounts (SNA). It includes the sum of the following liabilities: currency and deposits; securities other than shares; loans; insurance technical reserves; other accounts payable. Some liabilities such as shares, equity and financial derivatives are not included in this definition. According to the SNA, most debt instruments are valued at market prices.

The financial and economic crisis led to a strong deterioration in both general government deficits and debt in most OECD countries. Falling revenues (due to the decline in economic activity and tax reductions designed to stimulate the economy) coincided with sharp increases in government spending (social transfers, stimulus measures or support for financial institutions).

At end of 2012, the general government gross debt in the OECD area (30 countries) represented 113% of GDP, and more than 140% of GDP in Japan, Greece and Italy. On average in the OECD area, subnational government (SNG) debt accounted for 22% of GDP. SNG debt is unevenly distributed among OECD countries. At the state level (in federal or quasi-federal countries) debt varies from 6% of GDP in Austria to 21% in Spain, 27% in Germany and 52% in Canada. At the local level, it ranges from less than 2% in Greece to 38% in Japan.

The relatively small share of local government debt is driven by legal restrictions to local borrowing. In a majority of countries, local governments can borrow only for the long term to finance investment ("golden rule"). Moreover, local borrowing is generally governed by strict

prudential rules defined by central or state governments. Large differences among local governments are observed. For example, 4 out of the 17 autonomous communities in Spain and 2 out of the 10 provinces in Canada hold around three-quarters of the State's debt. Similarly, 3 out of the 16 Länder in Germany accounted for almost half of regional government debt in 2012. SNG debt per capita varies greatly, ranging from 340 USD in Korea to 18250 USD in the canadian provinces.

SNG fiscal balance reached -3.5% of SNG revenues in 2012 in the OECD area. SNG debt, defined here as "Maastricht debt" (i.e. resulting mainly from borrowing), represented 107% of SNG revenues. In Germany, Spain (autonomous communities), Canada (provinces) and the United States, SNG deficits exceed 5% of revenues while debt is above 100% of revenues (OECD, 2013).

UNIT 5

INCLUSION AND EQUAL ACCESS TO QUALITY SERVICES IN REGIONS

OECD governments, engaged today in structural reforms, need this information to increase job opportunities and fiscal sustainability, address inequalities and environmental challenges, and regain citizens' trust. The current OECD project How's Life in your Region? aims to advance work on measuring well-being and progress at the subnational level by providing a common framework for measurement and compiling a set of subnational well-being indicators for different types of regions (OECD, 2013).

5.1. Regional Disparities in Household Income

The disposable income of households can be seen as the maximum amount that a household can afford to spend on consumption goods or services without having to reduce its financial or non-financial assets or by increasing its liabilities. As such, it is a better indicator of the material wellbeing of citizens than gross domestic product (GDP) per inhabitant. Regions where net commuter flows are high may display a very high GDP per capita which does not translate into a correspondingly high income for their inhabitants (OECD, 2013).

Disparities in regional income per capita within countries are generally smaller than GDP per capita. Still, in 2009 the per capita income in the District of Colombia (United States) was twice as high as the country median income, and, in the bottom income state, Idaho, per capita income was roughly equivalent to the income of the median American in 1995. Similarly, in Chile, the Slovak Republic, Israel, Australia, Poland, Spain and the United Kingdom, inhabitants in the top income region were more than 30% richer than the median citizen.

Between 1995 and 2009, household income growth occurred with large regional variation both in countries displaying high income growth rates, such as Chile and the United States, and in countries with limited income growth, such as Hungary and Germany.

While the regional range measures the distance between the richest and the poorest regions in a country, the Gini index of household disposable income provides a measure of disparities among

21

all regions. According to this index, the Slovak Republic, Israel, Chile, and Italy were the OECD countries with the highest regional inequalities in 2009. Large increases in regional disparities between 1995 and 2009 are observed in the Czech Republic, the Netherlands, and Greece. In contrast, for the same period of time, regional disparities have decreased the most in Hungary, Chile and Israel.

A comparison between the regional household disposable income and the primary income (income generated primarily by market transactions) provides a measure of the public transfers to households. Current transfers to households significantly reduce the difference between the highest and lowest regional values; increases in the relative income level of regions (ratio between disposable income and primary income larger than 1), are found mostly in West Virginia, Mississippi, Kentucky (United States); Centro and Alentejo (Portugal); and Lubelskie (Poland).

5.2. Population Mobility Among Regions

Inter-regional mobility within countries is an important component of the change in the demographic structure and in the labour force supply. In the 28 observed OECD countries, around 18 million people changed their region of residence annually in the period 2009-2011. This movement corresponded to 4% of total population in Hungary, less than 0.5% in the Slovak Republic and to 2% of the total population in the OECD area, around half the value of the international migration rate to OECD countries (OECD, 2013).

Regional migration does not affect all regions of a country equally: Voreio Aigaio (Greece) and Tekirdag (Turkey) were the smaller regions with the highest positive net migration rate, 2.6% and 1.7% of the regional population, respectively. Yozgat (Turkey) and Luton (United Kingdom) were among the smaller regions with the highest negative net migration rates and the Northwest Territories (Canada) for the larger regions.

On aggregate, the net migration rate in the predominantly urban regions of 25 OECD countries was of 4.5 people per 10000 population in 2011 versus -2 and -8 in intermediate and rural regions, respectively. However, net migration rates were negative in urban regions in 10 countries, among which are Estonia, New Zealand, United Kingdom and Norway. On average rural regions were net recipients of regional migration in the United Kingdom, Greece, Portugal, Belgium and the United States.

Distance to markets and services seems to be a strong predictor of out-mobility: with the exception of Greece, Italy and Switzerland, remote rural regions – i.e. regions which are far in driving distance from urban agglomerations – show higher net negative flows than predominantly rural regions.

The mobility of young adults, which represents one-fifth of the total internal mobility for the observed 15 countries, is, on average, a migration from rural to urban regions where higher education facilities and more diverse job opportunities can be found. In Japan, the United Kingdom, Germany, Turkey and Switzerland, more than 80% of young migrants move to predominantly urban regions. Rural regions in Japan will bear the largest share of the future decline in population because of the already high incidence of an elderly population reinforced by out-migration of young people. In contrast, the youth migration flows towards Helsinki (Finland) and Stockholm (Sweden), even if still positive, decreased by half in the years following the economic crisis. The urban regions in the south of Italy have been losing their young population (negative net flows), even if the volume of outflows decreased in the period 1999-2011.

5.3. Regional Disparities in Unemployment

Unemployment has soared in OECD countries in recent years, from 5.6% in 2007 to 8% in 2013. In 2012, regional differences in unemployment rates within OECD countries were almost two times higher (32 percentage points) than differences among OECD countries (18 percentage points). Regional disparities in unemployment were already high before the economic crisis in countries such as the Slovak Republic, Finland, Italy and the Czech Republic (OECD, 2013).

Overall the economic downturn has aggravated problems of the most fragile regions. Among OECD countries in 2012 the largest regional disparities in unemployment rates were found in Spain, Italy, the Slovak Republic, Belgium and Canada.

Among the unemployed, the long-term unemployed (i.e. those who have been unemployed for 12 months or more) are of particular concern to policy makers because such individuals become increasingly unattractive to employers. In 2011, in almost 50% of the regions considered, one out of three unemployed was out of the labour market for more than a year. Similarly, the long-term unemployment rate showed large regional variations not only in dual economies such as Italy, but also in the Slovak Republic, Spain, Belgium, Greece and Hungary.

Young people have been hit the hardest by the economic crisis. Youth unemployment in OECD countries increased from 12.2% in 2007 to over 16% in 2012. Moreover, disparities in youth unemployment within countries have been accentuated by the crisis.

Youth unemployment is of particular concern in Spain, Italy, Mexico, Greece, Poland, Portugal and the Slovak Republic, where regional differences are high and some regions display a youth unemployment rate over 40%. These regions in European countries display also higher than average early leavers from education and training, suggesting the need for specific policies to improve the employability of these people through training and apprenticeship.

5.4. Gender Differences in Employment Opportunities

Regional disparities in participation rates, measured here by the Gini index, have generally decreased from 1999 to 2011 due to an increase in labour force participation in less advantaged regions. The Gini index showed the greatest decline in Ireland, thanks to an increase in labour force among the regions with relatively lower participation rates, but also due to a steep reduction of the labour force participation in Dublin. Countries like Canada, Greece and Turkey also show a significant decline in the Gini index between these two points in time. Regional inequalities in participation rates increased the most in Italy, Poland, and the Slovak Republic (OECD, 2013).

Despite the decrease in regional disparities regarding participation rates in most OECD countries, important differences in the access to labour markets are still present between men and women. About 69% of women in OECD regions were in the labour force, compared to 88% of men in 2011.

Regional differences in female participation rates were above 20 percentage points in Turkey, Italy, Israel, Poland and France. The largest difference in participation rates by gender are found in regions with different profiles. In countries like Mexico, Spain and Italy, the largest difference between male and female rates is found in Chiapas, Ceuta and Apulia, respectively, which are regions characterised by low GDP and income levels. However, in countries like the United Kingdom, Korea and Belgium, the capital regions are the regions where the participation rate of women is the lowest compared to that of men.

Broadening access to women in the labour market would require a mix of policies, including measures to reconcile family and work life. Regional differences in female participation rates

suggest that the availability and use of services to reconcile family and work life are also quite diverse within countries.

The female employment rate has increased in OECD countries over the past decades, reaching 57% in 2011. However, in around 26% of OECD regions, less than one out of two women was employed in 2011. Regional disadvantages in female employment were the largest in Turkey, Italy, Spain, Israel, the United States and the Slovak Republic.

5.5. Regional Access to Education

The quality of human capital is a key factor in the social and economic well-being of a region. Education provides individuals with knowledge and competencies to participate effectively in society and to break the cycle of disadvantage. Still, in 2012 one-fourth of the OECD population had only a basic education, and in most of the regions in Turkey, Mexico and Portugal, and in some regions in Australia and Spain, this proportion was as high as 50% (OECD, 2013).

Large regional differences in educational attainment within a country suggest disparity in access to education. Regional variations are generally found in countries with a high proportion of adults with only basic educational attainment. This is the case in Turkey, Mexico, Portugal, Spain and Chile. However, in Germany, Korea and the United States, the share of population with only basic education is lower than the OECD average, but regional differences are higher.

Completing upper secondary education dramatically reduces the unemployment rate among young people. Indeed, in the OECD area, the unemployment rate among individuals who did not complete upper secondary education is nearly three times higher than that of those who completed it, 13% and 5%, respectively (OECD, 2013a).

Whereas in Turkey and Mexico less than 40% of the labour force had at least an upper secondary education, this share was above 90% in the Czech Republic, Slovak Republic, Poland and Canada in 2012. Regional disparities in educational attainment persist also for higher levels of education; the highest are in Turkey, Spain, Mexico and Chile.

The share of young adults (aged 18-24) who have not completed upper secondary education and are not enrolled in training, referred to as "NEET", was equal to 18.6% in 2011 in the OECD area and 13.2% in the European Union area. Opportunities within countries also seem to be very

different. In Mardin (Turkey), Sicily (Italy), Central Greece and Ceuta (Spain), more than one-third of young people were neither employed nor in training.

Monitoring the outcomes of education in different regions can give insight on where and how to intervene. Countries that have undertaken the OECD PISA survey at the regional level show that regional disparities in learning can be large also in unitary educational systems. In the case of Italy, for example, the mathematics performance of the 15 years old students in Veneto is 93 score points higher than in Calabria, or the equivalent of two years of formal schooling. Large regional differences within countries, equivalent to more than one year of schooling also exist in Mexico, Spain, Canada, Australia and Brazil.

5.6. Regional Access to Health

Ensuring adequate access to health services for all the population is an important policy objective in OECD countries. This requires among other things an adequate supply of doctors and hospital beds in regions. The most important regional differences in the number of hospital beds per 10000 inhabitants can be found in Mexico, the United States and Canada, where regions like Campeche (Mexico), District of Columbia (United States), and Newfoundland and Labrador (Canada) had a number of hospital beds per capita more than two times higher than their country value (OECD, 2013).

In 2010, the regional variation in the number of physicians per population, a common indicator to measure differences in access to health services, was the largest in the United States and Czech Republic, (driven mainly by the large number in the national capital regions, the District of Columbia and Prague, respectively), and Spain. In the United States, the District of Columbia had a physician density of 8.8 physicians per 1000 inhabitants, more than three times the country average; the region of Prague displayed 7.5 physicians per 1000 inhabitants, almost two times higher than the national average.

When data at lower geographical scale are available, a higher supply of physicians is observed in predominantly urban regions, where cities facilitate the provision of medical infrastructure and services. Moreover, in some countries, urban regions may not only offer higher remunerations than their rural counterparts, but they also host certain amenities that may attract skilled physicians. This may create a significant mismatch between supply and demand for health services in rural areas, leading to delayed treatment, larger distances travelled, and higher costs for care. Considering the increasing life expectancy in OECD countries, high costs of care can

be a concern particularly for the elderly population (i.e. population aged 65 or more). In Norway, the Slovak Republic and Greece, the number of physicians per elderly inhabitant in urban regions is more than 2.5 higher than in rural regions.

Results from the 2012 OECD Health System Characteristics Survey show that the uneven geographic distribution of doctors remains an important policy concern in nearly all OECD countries. OECD countries have used a range of policies to influence the choice of practice location of doctors. These include: education-related policies designed to select students from rural areas or to provide them with some incentives to work in underserved areas after graduation, financial incentives to doctors to work in these regions and policies regulating the choice of practice location for new doctors, among others.

5.7. Safety in Regions

Safety is a critical element of well-being. The list of criminal activities is long and highly contextual and the measurement of some of them is a daunting task. Despite the fact that criminal activities like murder and car theft do not account for the whole spectrum of crimes faced by society, they can provide some basis for international co-operation. Recent analysis shows that the underlying causes of crime differ not only across but within countries calling for policies that take into account the regional heterogeneity of causes (OECD, 2013).

The OECD country with the highest murder rates, as well as the highest regional variation, is Mexico. In 2010, the region of Chihuahua (Mexico) had more than 100 murders per 100000 inhabitants, while the region Yucatan (Mexico) only had 1.8 murders per 100000 inhabitants. A wide regional disparity in murder rates is also found in the Russian Federation, ranging from 5 to 60 murders per 100000 inhabitants in Belgorod and Tyvar Republic, respectively. OECD countries with lower murder rates, but with significant regional disparities, are the United States and Chile. For these countries, this large variation is due to an outlier region with a very high rate: Washington, D.C. (United States) and Aysén (Chile) had murder rates at least three times higher than their country values.

The theft of private property, albeit to a lesser extent than the number of murders, has a negative effect on people's well-being. It reduces a household's wealth, increases the costs associated with robbery prevention, and increases people's perception of insecurity. Since this type of crime is commonly reported for insurances claims, it overcomes common issues of bias of statistics on property crimes due to different regional propensity to report the crime.

In 2010, the OECD countries showing the largest regional disparities for car theft were Spain, Mexico, the Slovak Republic and the United States. In these countries, regions like Ceuta (Spain), Chihuahua (Mexico), Bratislava (Slovak Republic) and the District of Columbia (United States) not only had the highest car theft rates in the country, but their rates were at least three times higher than the country value.

UNIT 6
ENVIRONMENTAL SUSTAINABILITY IN REGIONS

Environmental sustainability is defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality. The practice of environmental sustainability helps to ensure that the needs of today's population are met without jeopardizing the ability of future generations to meet their needs.

In other words environmental sustainability can be defined as – a state in which the demands placed on the environment can be met without reducing its capacity to allow all people to live well, now and in the future. Evidence is strong that we are exceeding and eroding the earth's carrying capacity, that there are limits to growth on a finite planet. Effects are interactive, complex, unpredictable and escalating, as we head for a global average temperature rise of more than 2 degrees centigrade over pre-industrial levels.

Environmental sustainability is the rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued indefinitely. If they cannot be continued indefinitely then they are not sustainable. Basically the world's standard definition of environmental sustainability is sustainable development, which means sustainable economic growth, which is an oxymoron. No form of economic growth can be continued indefinitely. Furthermore, all economic growth today is terribly environmentally degrading.

6.1. Air Quality in Regions

Air quality has a major impact on health, the environment, and the overall well-being of people. Two indicators are used to monitor air quality: Concentrations of fine particles in the air (particulate matter PM), and nitrogen dioxide (NO2). Both are considered by the World Health Organization (WHO) as major air pollutants with significant negative effects on respiratory and cardiovascular systems. Recent PM10 data for Europe show that across Eastern European countries, as well as Belgium, Greece, the Netherlands and Italy, a large share of population is exposed to elevated values of particulate matter above an annual average concentration of 20

μg/3. According to the WHO guidelines, the risk of adverse effects on health is very high above this threshold of annual average exposure (OECD, 2013).

NO2 concentrations across all OECD countries were computed for 2011-12 since PM10 data were not available on a global scale after the year 2006. An annual average exposure to NO2 values above 109 molec/cm2 is considered elevated, and critical above 1015 molec/cm2. Regional NO2 emission ranges clearly show that for the most part OECD regions are not exposed to health-concerning levels of NO2. However, annual average values are critically high in some regions, particularly large areas of eastern China as well as in some areas of Europe and North America.

The percentage of population that lives in regions with elevated and critical NO2 concentration is relatively low. However, the values express average emissions within a two-year time frame in which emissions fluctuate and can reach concentrations significantly above the WHO threshold for shorter periods in time. Therefore, the share of population exposed to health-concerning NO2 concentration can be considerably higher over a shorter time period.

With combustion processes from engines being a significant emitter of air pollutants, the number of cars on the road has a considerable impact on regional air quality, and fossil fuelled vehicle emissions directly impact the amount of NO2 and particulate matter in the air. Significant regional differences between the lowest and the highest per capita car ownership exist in the United Kingdom, Austria, Turkey and Poland.

6.2. Carbon Emissions in Regions

Carbon dioxide (CO_2) is the primary greenhouse gas emitted through human activities. While CO_2 occurs naturally in the atmosphere and is part of the earth's carbon cycle – the exchange of carbon between the atmosphere, oceans, soil, plants, and animals – human activities alter the carbon cycle by adding additional CO_2 into the atmosphere and at the same time influence the ability of natural carbon sinks, such as forests and oceans, to remove CO_2 from it. Despite the fact that CO_2 emissions come from a variety of natural sources, man-made emissions have accounted for the majority of the CO_2 increase in the atmosphere since the beginning of the industrialisation (OECD, 2013).

Wide ranges in CO_2 emissions per capita exist among regions within OECD countries. The highest values of CO_2 per capita were registered in some regions of Australia, Canada, Chile,

Greece, New Zealand and the United States, and, among non-OECD countries, the Russian Federation. Regional CO_2 emissions reached values as high as 550 tonnes per capita in Canada, and as low as 4.6 tonnes per capita in India. Part of these differences can be explained by the presence of greenhouse gas in low densely populated regions.

Compared to 2005, average per capita CO_2 emissions decreased in almost all OECD countries in 2008, particularly in Canada, and, for non-OECD countries, in Brazil. Levels of gross domestic product (GDP) tend to be positively correlated with CO_2 emissions since industrial production and other anthropogenic sources of CO_2, such as fossil fuel based transportation and electricity production, tend to be higher in economically thriving regions. However, the carbon intensity of a region, i.e. the ratio of regional GDP and regional CO_2, shows large regional differences, suggesting room for improvements. CO_2 efficiency of production increased across most OECD countries between 2005 and 2008.

The sectoral configuration of regional economies differs across OECD countries, and service sector based economies tend to be less carbon intensive. This highlights the need to better understand the mechanisms that drive CO_2 efficiencies, understanding the source of emissions by sector in different regions. The energy sector represents at least half of the total CO_2 emissions in most of the countries. In many countries, the concentration of CO_2 emissions by energy in a few regions is due to the fact that these regions produce electricity for the whole country. The share of CO_2 emissions from transport exceeds 50% in about half of the regions with the highest share of CO_2 emissions from transport.

6.3. Natural Vegetation and the Carbon Footprint of Regions

Reducing carbon emissions from anthropogenic sources such as industrial production and fossil-fueled transportation is paramount in the pursuit to reduce carbon footprints and tackle the challenge of global climate change. At the same time, natural vegetation and its ability to absorb carbon dioxide (CO_2) are central components in the mitigation of greenhouse gases. This natural process of CO_2 sequestration is the result of photosynthesis; hence, a region's potential to absorb carbon from the atmosphere is linked to its exposure to sunlight, precipitation and green leaf biomass (OECD, 2013).

Positive regional Net Ecosystem Productivity (NEP) indicates the regional potential to capture carbon from the atmosphere (sequestration), thanks to the presence of forests. Negative regional values indicate that carbon sequestration is outweighed by carbon release from the soil.

Central to interpreting these data is the fact that a region's carbon sink capacity is not static and varies over time as climate conditions change as well as the amount of green leaf biomass. And, while carbon sequestration capacity plays an important role in the discussion on global climate change, it is itself influenced by climate conditions in the first place. With temperature and precipitation influencing the amount of CO_2 released from the soil, and the level of photosynthesis driving the amount of CO_2 that can be sequestered from the atmosphere, evaluating an ecosystem's carbon sink potential is a complex task.

Countries in the southern hemisphere as well as those situated in lower latitudes of the northern hemisphere are the ones most subject to large regional variations in carbon sequestration.

Converting natural land to land for urban uses adds pressure on the potential to sequester carbon from the atmosphere, particularly when converting from green leaf biomass such as forests. Preserving natural landscapes remains a central cornerstone in greenhouse gas mitigation. Across the OECD, urban land conversion from agricultural land accounted for the largest share, followed by forests. In Austria, Finland, Slovenia, Sweden and the United States, the share of forest within the overall land conversion was relatively high or even higher than the share of agricultural land.

Across the OECD, the share of regional land covered by vegetation shows comparable maximum values for most countries, but large differences exist in countries' average coverage. Generally higher percentages can be found in countries of the northern latitudes, which on average also show higher values in NEP.

6.4. Municipal Waste

Efficient waste management plays an important role for public and environmental health. It prevents the formation of greenhouse gas emissions such as methane and other toxic gases that form through the degradation of organic waste in landfills, and particularly in warmer climates, effective waste management reduces the risk of spreading diseases. While inefficient waste management has negative impacts on landscapes and watercourses, other environmental concerns result from the fact that some disposal items are made from limited resources. Hence, re-using such items reduces the pressure on natural resources and increases resource efficiency. In addition, waste disposal has an important economic implication for local governments which are usually responsible for its management.

In 2010, OECD country municipal waste production varied from 300 kg per capita in Estonia to 750 kg per capita in the United States. At national level, per capita waste decreased in about half of the OECD countries between 1995 and 2010, particularly in Estonia, New Zealand, Norway and Slovenia. Despite the use of different methodologies in accounting for national waste, which could influence the comparison of national data, the strong decreases in some countries indicate overall improvements in waste management practices.

Large differences also exist in generated waste per capita within the same country. The largest regional differences are found in Sweden, where per capita waste disposal is as low as 18% of the national average in the region of Stockholm and as high as 250% of the national average in the region of Central Norrland.

Regional waste generation can be affected to some degree by the industrial production of consumer commodities that are consumed outside the region where the waste gets charged. However, effective waste management can have a positive impact on reducing the total amount of generated total waste, as shown for example in Germany where the waste produced in the region of Berlin was only 35.2% of the country's average value in 2010.

Different municipal waste management practices, individual consumer behaviours, and different standards for the packaging of consumer commodities all influence variations in regional per capita waste values. Data on regional recycling rates supports this assumption. For the few countries where regional recycling rates are available, the large regional variations within a country can be explained by different waste management practices and behaviour. In Sweden these values range from 15.3% to 83.6% of total waste recycled, while strikingly not less than 80% of total waste gets recycled in Austrian regions (OECD, 2013).

UNIT 7

REGIONAL AND SMALL AREA SITUATION (COUNTRY CASE: BANGLADESH)

The population and housing census provides information on geographic and administrative distribution of population and household in addition to the demographic and socio-economic characteristics of all the people in the country. The data from the census are classified, tabulated and disseminated so that researchers, administrators, policy makers and development partners can use census data in formulating and implementing various multi-sectorial development programs at the national and community levels. However, results from various reports on socioeconomic, demographic and environmental surveys are exhibited in this chapter.

7.1. Population, Area and Density in Regions

The total population of Bangladesh as enumerated in 2011 census were 144043697 of which 72109796 (50.06%) were male and 71913901 (49.94%) were female. Dhaka is the largest division with 32.92% population and Barisal is the smallest division with 5.78% population. Area for Chittagong division is the highest among eight divisions of Bangladesh which is numbered as 33,908.55 sq. km. while Mymensingh division is the smallest and stands for 10,584.06 sq. km. Population density is found to be highest in Dhaka division which is 1,751 per sq. km. and is smallest in Barisal division that stands for 613 per sq. km (BBS, 2012).

It needs to be mentioned that there are 64 districts (zila), 488 sub-districts (upzila) and 4550 union-parishads in Bangladesh respectively. It is observed that Shyamnagar upazila of Satkhira zila is the largest upazila and Bandar upazila of Narayanganj zila is the smallest upazila in the country in respect of area.

The total households enumerated in the Housing and Population Census 2011, are 32173630 of which 7502040 in urban area and 24671590 in rural area. The average household size for the country is 4.4. The size is same i.e. 4.4 for urban area and for rural area the size is slightly higher i.e. 4.5. It is also found that the household size is the biggest i.e. 5.5 in Sylhet Division and the smallest i.e. 4.1 in Rajshahi Division and Rangpur Division as compared to other divisions in the country.

7.2. Livestock Population by Regions

The breeds of livestock and poultry available in Bangladesh are as follows: **Cattle:** (i) local breed of cattle- non-descript indigenous type, Red Chittagong Goyal, Pabna Cow; (ii) Exotic: Hariana, Sindhi, Shahiwal, Jersey, and Holstien-Friesian; (iii) Hybrid: Bos indicus'Bos taurus. **Buffalo:** (i) River type, (ii) Swamp type, (iii) River'Swamp type. **Goat:** (i) Black Bengal, (ii) Jamuna Pari, (iii) Crossbred- Black Bengal'Jamuna Pari. Sheep: non-descript indigenous type. **Poultry:** (i) non-descript indigenous type - Asseel, Chittagong Fowl, and Naked Neck; (ii) Exotic: White Leghorn, Rhode Island Red, Fayomi, Australop, several commercial broiler and layer breeds; (iii) Crossbreed: Indigenous'Exotic. **Duck:** (i) Local: non-descript indigenous type, Sylhet Mete, Nageswari, Moscovy, Goose; (ii) Exotic: Khaki Cambell, Indian Runner, Jinding, Cherry Valley; (iii) Crossbreed: Indigenous'Exotic. **Pig:** non-descript indigenous type.

Bangladesh livestock population are scattered all over the country but their density and marketing system are not similar. Dairy cattle of smallholders are located mostly in Pabna, Sirajganj, Kushtia, Satkhira, Khulna, Rangpur, Dinajour, Naogaon, and Chittagong districts. Buffalos are found in Bhola, Noakhali and Satkhira mostly in the Char areas of the coastal belt of the southern districts. Goats and Sheep are developed in Meherpur, Kushtia, Jhenaidah, Jessore, Satkhira, Naogaon and Bogra districts.

Ducks are heavily populated in Sunamganj, Netrokona, and Kishoreganj and in the Haor districts. Traditional poultry in backyard farming system spread all over the country, but commercial poultry differs district to district. These all are dependent on marketing, infrastructure, communication, transportation and access of farmers to inputs resources. So the planning process and the extension methodology would be based on locations specific resources. Manpower setting and distribution of support services & input supply would be ensured according to agro-ecological situations in Bangladesh, these are: (i) plain land, (ii) haor area, (iii) coastal belt and saline zone, and (iv) draught prone northern area.

Livestock population in Bangladesh is currently estimated to comprise 25.7 million cattle, 0.83 million buffaloes, 14.8 million goats, 1.9 million sheep, 118.7 million chicken and 34.1 million ducks. The density of livestock population per acre of cultivable land is 7.37. This density has been increasing every year in the country (BBS, 2009).

7.3. Employment and Labour Force Participation in Regions

According to Labour Force Survey 2010, among the working age population 23.2 million were in the urban areas and 72.4 million were in the rural area. Of the working age population, 47.9 million were male and 47.7 million were female. In the urban area 11.6 million were male and same number of female were observed. On the other hand, in the rural area 36.3 million were male and 36.1 million were female. It is notable that the percentage of population 65 years and over were higher in rural area compared to urban area. Such percentage in the rural area was 6.6% compared to 4.7% in the urban area (BBS, 2011).

In the urban area, of the total 23.2 million population of age 15 years and over, 13.3 million were in the labour force and the rest 9.9 million were outside the labour force. In the rural area out of 72.4 million population of age 15 years and over, 43.4 million were in the labour force and 29.0 million were outside the purview of the labour force. In the urban area, of the total labour force 12.4 million were employed and 0.9 million were unemployed. In the rural area, of the total labour force 41.7 million were employed and 1.7 million were unemployed.

It is observed that the highest 18.1 million (32.0%) labour force exist in Dhaka division followed by Rajshahi division 15.5 million (27.3%) and chittagong division 9.5 million (16.8%). The volume of male and female labour force also follow the same pattern. Among the males 12.6 million (31.9%) labour force were found in Dhaka division followed by Rajshahi division 10.6 million (26.8%) and Chittagong division 6.8 million (17.7%). For the females, the highest 5.5 million (32.4%) labour force were in Dhaka division followed by Rajshahi and Chittagong division the corresponding volume were 4.9 million (28.5%) and 2.7 million (16.0%).

7.4. Food Grains Production by Regions

'Ganges Tidal Floodplain' for rural literacy rate, 'Karatorya Floodplain and Atrai Basin' for ratio of agricultural workers and per capita food-grains production and 'Brahmaputra-Jamuna Floodplain' for number of co-operative societies and share of regional domestic agricultural products were the best regions in the recent years. It means that socioeconomic progress was occurred in different regions in the last 20 years (BBS, 2009).

'Middle Meghna River Floodplain' and 'High Ganges River Floodplain' had the highest and second highest yield growth rate of HYV rice respectively whereas 'Chittagong Coastal Plain and St. Martin's Coral Island' and 'Greater Dhaka' had the highest and second highest yield of food-grains respectively. It is also revealed that 'Old Himalayan Piedmont Plain and Tista Floodplain', 'Karatoya Floodplain and Atrai Basin', 'Brahmaputra- Jamuna Floodplain',

'Middle Meghna River Floodplain' and 'Chittagong Coastal Plain and St. Martin's Coral Island' are the high developed regions in Bangladesh.

The process of agricultural development in the 'Low Ganges River Floodplain', 'Lower Meghna River and Estuarine Floodplain' and 'Eastern Hills', as the study reveals, is slow and unbalanced over the space. These regions require improvement of various dimensions for enhancing their levels of development. Thus, there is a need for taking some immediate steps to put a check in this unbalanced and lop-sided growth of the regional economy and should be given special priority to bridge-up the immense development by the proper agricultural policy.

The factors should be identified that are responsible to influence the variations of crop sector's growth in different regions for the improvement in agricultural growth. The imbalances between the regions should be measured to formulate the strategies for balanced agricultural development in depressed regions. It needs to be mentioned that Boro is the most important crop in Bangladesh in respect of volume of production. It has been persistently contributing to higher rice production in last successive years.

7.5. Household Income, Expenditure in Regions

This section details with estimates of household income and expenditure based on the findings from Household Income and Expenditure Survey 2010 by BBS. Income and expenditure estimates are central to the entire findings of the Survey.

The average monthly household income in 2010 is estimated at Tk. 11,479 at the national level, Tk. 9,648 in rural area and Tk. 16,475 in urban area. In 2005, the same was Tk. 7,203 at the national level, Tk. 6,095 in rural area and Tk. 10,463 in urban area. Average nominal income increased by 59.38 percent at the national level, 58.27 percent in rural area and by 57.48 percent in urban area in 2010 relative to 2005. Real incomes grew by 15 percent at the national level, 13 percent in rural areas and 14 percent in urban areas. Such increases over a five year period are indeed small and this primarily reflects significant under-reporting of income. It is therefore useful to look at the expenditure side as well.

In 2010, the average monthly household expenditure is estimated at Tk. 11,200 at the national level, Tk. 9,612 in rural area and Tk. 15,531 in urban area. In 2005 the same was Tk. 6,134 at the national level, Tk. 5,319 in rural area and Tk. 8,533 in urban area. In nominal terms, it increased by 82.59 percent at the national level, 80.71 percent in rural area and by 82.01 percent

in urban area relative to 2005. Real expenditure increased by 38.1 percent at the national level, 35.6 percent in rural areas and 38.6 percent in urban areas (BBS, 2011).

7.6. Regional Poverty

The population in Bangladesh is predominantly rural, with almost 80 percent of the population living in rural areas. Many people live in remote areas that lack services such as education, health clinics, and adequate roads, particularly road links to markets. An estimated 36 percent of the population in rural areas lives below the poverty line. They suffer from persistent food insecurity, own no land and assets, are often uneducated, and may also suffer serious illnesses or disabilities. Another 29 percent of the rural population is considered moderately poor. Though they may own a small plot of land and some livestock and generally have enough to eat, their diets lack nutritional value. As a result of health problems or natural disasters, they are at risk of sliding deeper into poverty. Women are among the poorest of the rural poor, especially when they are the sole heads of their households. They suffer from discrimination and have few earning opportunities, and their nutritional intake is often inadequate (BBS, 2011).

An estimated 28 percent of the population in urban areas lives below the poverty line. People living in urban areas, like Dhaka, Chittagong, Khulna, and Rajshahi, enjoy a better standard of living, with electricity, gas, and clean water supplies. Even in the major cities, however, "a significant proportion of Bangladeshis live in squalor in dwellings that fall apart during the monsoon season and have no regular electricity. These Bangladeshis have limited access to health care and to clean drinking water."

Among seven divisions, Rangpur Division has the highest rate of poverty (42.3) and the poverty rate of rural areas has doubled than that of urban areas. Although the rate of poverty in Barishal Division was highest (52%) in 2005, it has declined by 5.7 percent in 2010.

One of the main causes of poverty are endemic corruption and an incompetent government that does little to build infrastructure and good law and one of the main causes of rural poverty is due the country's geographical and demographic characteristics. A large proportion of the country is low-lying, and thus is at a high risk to flooding. Many of the rural poor live in areas that are prone to extreme annual flooding which cause huge damage to their crops, homes and livelihoods. In order to rebuild their homes, they often have to resort to moneylenders, and that causes them to fall deeper into poverty.

Another cause of rural poverty is due to the fast-growing population rate. It places huge pressure on the environment, causing problems such as erosion and flooding, which in turn leads to low agricultural productivity.

The causes of urban poverty are due to the limited employment opportunities, degraded environment, and bad housing and sanitation. The urban poor hold jobs that are labor demanding, thus affecting their health conditions. Therefore, the urban poor are in a difficult situation to escape poverty.

7.7. Regional Educational Status

Among the socio-economic differentials in influencing the demographic parameters of a population, educational attainment of the individuals is the most important one. It influences individual's knowledge, attitudes and codes of ethical behavior that guide moral choices about our relationship with others.

The literacy rate for population 7 years and above of the country is 51.77% for both sex, 54.11% for male and 49.44% for female. The data shows that 55.93% population aged 7 years and above of Barisal Division are literate which is the highest rate in the country while the lowest rate i.e. 43.10% is found in Sylhet division (Bangladesh Population Census 2011).

The low level of illiteracy among the rural people remains pronounced. For example, while about 18 percent of males in the urban area have no education, the extent of this illiteracy remains prevalent in more than 27 percent of the cases among the rural males. This difference in illiteracy is even more pronounced among the females: 21.9 percent in urban area and 32.2 percent in rural area. People of Barisal division are less likely to be illiterate (13.2% males and 165% females), while males of Rajshahi division (29.4%) and females of Rangpur division (35.1%) are more in proportion to remain illiterate (MSVSB 2013).

7.8. Regional Health Status

In the 2014 BDHS, Khulna and Rangpur Divisions have the lowest TFR (1.9 births per woman) and Sylhet Division has the highest TFR (2.9 births per woman). The data indicate that in the last three years fertility has slightly declined in four divisions (Barisal, Chittagong, Rangpur, and Sylhet), remained the same in two divisions (Khulna and Rajshahi) and slightly increased in Dhaka division. Since Dhaka is by far the largest division – comprising one-third of

Bangladesh's population – the fertility rate of this division has a large impact on the national fertility rate.

Crude birth rate (CBR), the simplest measure of fertility has been estimated to be 18.9 per thousand population. The rural CBR, as expected, is higher than the urban CBR, 19.4 versus 17.2. The general fertility rate worked out to 71 per thousand women with 75 in rural area and 60 in urban area. The total fertility rate (TFR) remains in the neighborhood of 2.1, which is exactly same as the one recorded in the previous year (SVRS 2014).

The crude death rate was 5.2 per 1000 population with a rate of 5.6 in the rural area and 4.1 in the urban area. This rate has declined from 5.6 in 2010 to 5.2 in 2014. The males have been found to experience higher mortality risk than their female counterparts. This is true for both urban and rural areas: rural children remain at a higher risk of mortality than the urban children (SVRS 2014).

Use of contraception is higher in urban (66 percent) than in rural areas (61 percent). With regard to method use, after oral pills, rural women are more likely to use injectables while urban couples prefer condoms. The contraceptive use rates are 63 percent or higher in all divisions except Chittagong (55 percent) and Sylhet (48 percent). Rangpur and Rajshahi have the highest contraceptive use rates – almost 70 percent (BDHS 2014). Contraceptive prevalence rate has shown a moderate increase over the last five years, from 56.7 in 2010 to 62.2 in 2014, about 10 percent increase in 5 years. The urban women are more in proportion (64.5%) than their rural counterparts (61.6%) in using contraceptives (SVRS 2014).

In the stages ante-natal, delivery and post-natal care cost in urban area was higher than that in rural area. Average expenditure for ante-natal care was Tk.1187 whereas it was Tk.1021 in rural area and Tk.1814 in urban area. Average expenditure for delivery care in case of cesarean Tk.13032 and in case of normal delivery the cost was Tk.1251. The expenditure for caesarian delivery in rural area was Tk.12535 and Tk.13804 in urban area. For normal delivery the average expenditure in rural area was Tk.1097 while in urban area it was Tk. 1982. On an average post-natal care in rural area was Tk.889 and in urban area it was Tk.1503 (HMSS 2012).

The level of vitamin A supplementation varies across subgroups of children. It is higher among older children and children who live in urban areas. Across divisions, vitamin A supplementation is 65 percent or higher in Chittagong, Khulna, and Rangpur, but lower than 60

percent in Rajshahi and Sylhet. Rural children are more likely to be stunted than urban children (38 percent compared with 31 percent). Stunting is most prevalent in Sylhet (50 percent) and lowest in Khulna (28 percent) (BDHS 2014).

Knowledge of HIV/AIDS is higher among urban than rural women (85 compared with 64 percent). Awareness of HIV/AIDS ranges from a high of 77 percent among women in Khulna to 60 percent in Sylhet (BDHS 2014).

7.9. Waste Management in Regions

The most outstanding findings of the study 'Hazardous Waste Management in Bangladesh: A Country Inventory' conducted in 2010 is the geographical concentration of the hazardous industries in Bangladesh as it clearly emerged from mapping of their locations and overlaying, i.e., superimposing one map with location of one type of industry upon another until all seven groups' locations were seen at a glance. This exercise shows that Dhaka and Chittagong regions have the highest concentration of hazardous waste generating factories. Within the Dhaka region, the largest concentration is in Gazipur districts followed by Dhaka, Narsingdi and Narayanganj. Next most common location of hazardous waste generating industries are in the districts of Sirajganj, Tangail, Mymensing, Sylhet, Rangamati, and Comilla.

GLOSSARY

Carbon dioxide (CO2)

CO_2 emissions in metropolitan areas are estimated by adjusting national emission data with population grid data and infrastructure location. They include emissions from all sources with the exception of air transport, international aviation and shipping. CO_2 emissions from transport include road and non-road transportation.

Cattle

Cattle refer to domestic animals of the species Bos taurus (cattle), including hybrids like Beefalo; together with Bubalus bubalis (water buffalo), they are called bovines.

Census

A census is a survey conducted on the full set of observation objects belonging to a given population or universe.

Crude Birth Rate (CBR)

The ratio of live births in a specified period (usually one calendar year) to the average population in that period (normally taken to be the mid year population). The value is conventionally expressed per 1000 population.

Crude Death Rate (CDR)

The crude death rate (CDR) is the number of deaths per 1000 mid-year population in a given year.

Employed persons

All persons who during the reference week worked at least one hour for pay or profit, or were temporarily absent from such work.

Functional urban areas

Defined in 29 OECD countries according to a harmonised methodology that identifies all the urban areas in a country with more than 50000 people. The functional urban areas are defined as

densely populated municipalities (urban cores) and adjacent municipalities with high levels of commuting towards the densely populated urban cores (hinterland).

Gini index

The Gini index is a measure of inequality among all regions of a given country. The index takes on values between 0 and 1, with zero interpreted as no disparity. It assigns equal weight to each region regardless of its size; therefore, differences in the values of the index among countries may be partially due to differences in the average size of regions in each country.

Gross Domestic Product (GDP)

The standard measure of the value of the production activity (goods and services) or resident producer units.

Household

Household is defined as a unit consisting of group of persons, related or unrelated, live together and taking food from the same kitchen.

Infant Mortality Rate (IMR)

The number of deaths occurring during a given year among the live-born infants who have not reached their first birthday, divided by the number of live births in the given year and usually expressed per 1000 live births.

Labour force (economically active population)

Economically active population or labour force is defined as persons aged 15 years and over, who are either employed or unemployed during the reference period of the survey (week preceding the day of survey). It excludes disabled and retired persons, income recipients, full time housewives and students, beggars and other persons who did not work for pay or profit at least one hour during the reference week.

Labour productivity

This is measured as the ratio between GDP and total employment in metropolitan areas.

Literacy

A person who is able to write a simple letter is defined as literate.

Literacy Rate (Age 7+ yrs)

Percentage of population of age 7 years and over who can write a letter to the total population of the same age-group is the literacy rate.

Metropolitan areas

Defined as the functional urban areas (FUA) with population above 500000.

Municipal waste

It is generally defined as the total waste collected by or on behalf of municipalities. It includes waste from households, commerce, institutions and small businesses, and yard and garden. The definition excludes municipal waste from construction and demolition and municipal sewage.

NO2

NO2 regional emissions are extracted from global monthly average NO2 emission raster data based on 0.25 degree grid cell size. Monthly average NO2 rasters for the months January 2011 to December 2012 have been assembled and the average values for the 24 month period have been calculated.

PM10

PM10 are fine particles smaller than 10 micrometres that float in the air and access the respiratory system. NO2 is one of the main sources of nitrate aerosols, which form an important fraction of PM2.5, and of ozone when exposed to ultraviolet light. Main sources of PM and anthropogenic NO2 emissions are fossil fuel based combustion processes.

Poultry

Poultry refers to domestic birds of the following species: hens and chickens; ducks; quail; guineafowl; pigeon etc. It excludes, however, birds raised in confinement for hunting purposes and not for meat production.

Public investment

Defined as the sum of:

- direct investment = gross capital formation and acquisitions, less disposals of non-financial non-produced assets during a given period; and
- indirect investment = capital transfers; i.e. investment grants and subsidies in cash or in kind made by subnational governments to other institutional units.

Subnational government (SNG)

Defined as the sum of the two subsectors of the general government data:

- Federated government ("states") and related public entities, relevant only for countries having a federal or quasi-federal system of government;
- Local government; i.e. regional and local governments and related public entities.

Total Fertility Rate (TFR)

The sum of the age-specific fertility rates (ASFRs) over the whole range of reproductive ages for a particular period (usually a year). It can be interpreted as the number of children; a woman would have during her lifetime if she were to experience the fertility rates of period at each age and no mortality till they reach to their reproductive period.

Unemployed persons

Defined as those who are without work, are available for work, and have taken active steps to find work in the last four weeks.

Unemployment rate

Defined as the ratio between unemployed persons and labour force, where the latter is composed of unemployed and employed persons.

Youth unemployment rate

Defined as the ratio between unemployed persons aged between15 and 24 and the labour force in the same age class.

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