Chapter 6

Access to Drinking Water and Sanitation Services in Indonesia: Regional Progress from 1999 to 2017

Takayuki Higashikata

Abstract

We summarize the progress of Indonesian households' access to drinking water and sanitation services from 1999 to 2017. First, through international comparison, we show that Indonesia is lagging behind other neighboring middle-income countries in access to those services. Next, we introduce the ambitious target set by the Indonesian government in a 2015 five-year midterm development program to provide safe drinking water and basic sanitation services to all households in Indonesia. Finally, we describe the progress in access to the services by province and district (*kabupaten/kota*). We find a steady growth in the share of households with access to safe drinking water and basic sanitation during the period investigated. However, we also find slow progress in access to garbage pick-up systems in rural districts.

Keywords: Indonesia, urbanization, safe drinking water, human waste management, garbage disposal

1   Introduction

Developing countries experience rapid urbanization. According to World Bank estimates, the share of urban population in low- and middle-income countries reached 49.5% in 2017 from 39.9% in 2000.[1] Although urbanization can provide higher wages for workers mainly through agglomeration effects of increasing returns to scale, which in turn attracts firms and create more jobs, many developing countries have difficulty in mitigating persistent problems associated with urbanization such as continuous growth of slums and inadequate provision of urban services including safe water and basic sanitation services (UN-HABITAT 2016).

This paper provides a progress perspective on public access to drinking water and sanitation services in Indonesia. Indonesia is a middle-income country and has also experienced rapid urbanization from 42% in 2000 to 54.7% in 2017 (Figure 6.1). This means the share of urban population has grown faster than the average of developing countries. However, we must be careful in comparing urbanization rates of countries as the definition of 'urban' varies among countries.[2]

<Figure 6.1>

We summarize how Indonesia has improved access to sanitation services and drinking water through household survey data and community-level census data from 1999 to 2017. We do this on a national and provincial level. We then check the relationship between urbanization and the share of households with better access to safe drinking water, basic sanitation, and garbage pickup services using district (*kabupaten/kota*) level information as local district governments have been responsible for providing those services since the 2001 implementation of decentralization.

The rest of this paper is structured as follows. The next section describes Indonesia's situation as compared with neighboring countries, and section 3 analyzes the data on regional progress in access to safe drinking water and basic sanitation services such as human waste management and garbage treatment system. Lastly, section 4 concludes the paper.

2 Public Access to Basic Drinking Water and Basic Sanitation Services in Indonesia

(1) International Comparison

First, we compare Indonesia to other countries on public access to basic drinking water services, which is defined as drinking water provision through low-cost technologies such as handpumps (installed on boreholes, tube wells, or dug wells), spring catchment, gravity-fed systems, rainwater collection, storage tanks, and small distribution systems (JMP 2011). Data from WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) [3] suggests that Indonesia achieved a relatively modest

population share with access to basic drinking water services in 2015 (Figure 6.2). Although Indonesia's urbanization rate [4] was higher than that of Vietnam, the Philippines, and Thailand, the population share with basic drinking water services was lower in Indonesia (89.5%); that of the Philippines was 90.5%, Thailand was 98.2%, and Vietnam was 91.2%. However, this could be because of the different definition of urban among countries. We, then, turn to Figure 6.3, which shows the relationship between per capita income[5] and the population share with basic drinking water services. As shown in the figure, the per capita income of Indonesia was higher than Vietnam and the Philippines, though Indonesia's share of basic drinking water services was lower.

<Figure 6.2>
<Figure 6.3>

Next, we check the population share with basic sanitation services, which is defined as the use of improved sanitation facilities not shared with other households (JMP 2018). Figure 6.4 shows the relationship between urbanization rates and the population share with basic sanitation services. As in Figure 6.2, the share of Indonesian households who had access to basic sanitation (67.9%) was below the level of Lao (72.6%), the Philippines (75.0%) and Vietnam (78.2%), though these countries had lower urban population share as well as smaller per capita income (Figure 6.5).

<Figure 6.4>
<Figure 6.5>

These figures show that, by international comparison, especially to neighboring southeast middle-income countries, Indonesian people had a relatively lower level of access to basic drinking water and sanitation services.

(2)   National Medium-term Development Plan (2015-2019)

How does the Indonesian government tackle the issue of low-level access to drinking water and sanitation services? Moreover, Indonesia should struggle to meet the target

on the provision of safely managed drinking water services to all (target 6.1) and safely managed sanitation services (target 6.2) as set by the 2030 Agenda for Sustainable Development adopted at the 2015 United Nations Sustainable Development Summit.

Every five years, the Indonesian government, under newly elected presidents, presents a midterm national development plan. The latest National Medium-term Development Plan (*Rencana Pemerintah Jangka Menengah Nasional*: RPJMN) 2015-2019 revealed that the government would provide access to improved sanitation and safe drinking water to all Indonesians by 2019 (KPPN/Bappenas 2014).[6]

The plan explained that the government would increase the share of residents with access to safe drinking water (*akses air minum layak*) from 70% in 2014 to 100% by 2019. It also said that 85% of the residents would have access to sufficient drinking water (at least 60 liter/person/day), of good quality (protected against contamination), readily available, and affordable (within 30 minutes collection time). The rest of the 15% would have access to drinking water for basic needs (at least 15 liter/person/day).[7]

Regarding public access to improved sanitation, the Indonesian government planned that the population share with access to the service would be raised from 60.9% in 2014 to 100% by 2019. Access to standard sanitation services such as an on-site and integrated system of sewage treatment, urban trash service, waste management with 3Rs, and flooded area reduction by 22,500 ha would be provided for 85 % of the population. The remaining 15% would have access to basic needs.

In order to monitor community-based health status, including the progress of access to safe drinking water and basic sanitation services provision, the Indonesian Ministry of Health has collected data under the National Basic Health Research (*Riset Kesehatan Dasar*: Riskesdas) since 2007 in collaboration with Indonesia's central statistics office (*Badan Pusat Statitik*: BPS). Riskesdas has been implemented to collect original data using household survey samples of the National Socio-Economic Survey (*Survei Sosial Ecoomic Nasional*: Susenas) that collects socioeconomic information every year by BPS. The following section highlights improvement, mainly through the Susenas series, in safe drinking water and basic sanitation services including garbage pickup in Indonesia.

3 Improvement by Region from 1999 to 2017

(1) Data

Indonesia has 34 provinces, under which are 514 districts (*kabupaten/kota*) as of 2017. The provinces used to be 26,[8] and the districts were around 300 in the 1990s. The

number has, however, increased dramatically after the introduction of decentralization in 2001. Our analysis combines provinces such as Kepulauan Riau, Papua Barat, Sulawesi Barat, and Kalimantan Utara into 'mother' provinces to construct a panel dataset of 30 clusters and compare variables of interest under the same administrative unit. As for the comparison among districts between different years, we also make a panel data of 497 district levels.[9]

We used data on large scaled households collected every year and village-level census data collected every three years by BPS. The former, Susenas, has collected demographic information including age, sex, education level, and employment, as well as household characteristics including place, monthly expenditure, and environmental condition. The latter, Village Potential Data Collection (*Potensi Desa*: Podes), has collected data to evaluate the level of community (*desa*/*kelurahan*) development before the census (population census, agricultural census, and economic census).

The Susenas survey is basically designed to get representative information at the district-level, though Aceh province was not covered in 2000 and 2001 and data for Maluku and Maluku Utara in 2001 are not available. Moreover, BPS conducted the survey mainly in urban communities for Aceh, Maluku, Maluku Utara, and Papua provinces in Susenas 2002. Thus, those samples were dropped from the analysis.

For analysis on drinking water and sanitation, we used household level data of Susenas from 1999 to 2017, of which sample size is 200,433 in 1999 and 251,142 in 2017. Susenas asked for the main source of drinking water, and the respondents chose one from a set of items. For example, in Susenas 2014, BPS prepared answers as follows: 1. Brand bottled water (*air kemasan bermerk*), 2. Refillable bottled water (*air isi ulang*), 3. Metered tap water (*leding meteran*), 4. Retailed tap water (*leding eceran*), 5. Pump (*sumur bor*/*pompa*), 6. Protected well (*sumur terlindung*), 7. Unprotected well (*sumur tak terlindung*), 8. Protected spring (*mata air terlindung*), 9. Unprotected spring (*mata air tak terlindung*), 10. River (*air sungai*), 11. Rain (*air hujan*), and 12. Others. These items are hardly modified by round; in Susenas 1999, BPS set 10 items, and 'brand bottled water' was not there in the questionnaire. In the next section, we pay attention to the change of resident share depending on these: bottled water (brand one and refillable one), tap water (metered one and retailed one), pump, and protected well.[10]

Next, Susenas asked for the place of human waste disposal (*tempat pembuangan akhir tinja*), and respondents chose one from the following items if in Susenas 2014: 1. Septic tank/sewage management system (*tangki*/*SPAL*), 2. Pond/rice field (*kolam*/*sawah*), 3. River/lake/sea (*sungai*/*danau*/*laut*), 4. Pit (*lubang tanah*), 5. Beach/garden/yard

(*pantai/tanah lapang/kebun*), and 6. Others. This study examined the share of residents who had access to septic tanks or other sophisticated systems such as sewage management systems (*Sistem Pengelolaan Air Limbah*: SPAL) and wastewater treatment plants (*Instalasi Pengolahan Air Limbah*: IPAL). [11] Our analysis dropped samples of Susenas 2005 because the survey did not have questions regarding human waste disposal. Moreover, we carefully interpreted the results of Susenas 2017 since the questionnaire structure was changed and only 84.5% of respondents answered the question regarding human waste disposal.

Third, we used Podes from 1999 to 2014 for garbage management analysis. The sample size of Podes is 68,783 for 1999 and 82,190 for 2014. Podes 2014 asked where most community households put their trash (*tempat buang sampah sebagian besar keluarga*), and respondents chose one from the following: 1. Garbage pickup area, then carried away (*tempat sampah, kemudian diangkut*), 2. Dumped in a hole/burned (*dalam lubang atau dibakar*), 3. River/irrigation canal/lake/sea (*sungai/saluran irigasi/danau/ laut*), 4. Drainage canal (*drainase (got/selokan)*), and 5. Others. We assumed all community households use the same garbage disposal method and calculated the household shares in the district. [12]

(2)　Drinking Water

This subsection highlights the change of the main drinking water source from 1999 to 2017 using Susenas data. We then compare the share of households having access to safe drinking water with reference to a WHO and UNICEF definition. According to JMP (2018), safely managed drinking water is defined as "drinking water from an improved water source which is located on premises, available when needed, and free of fecal and priority contamination." Susenas series asked an additional question to respondents who used pumps, wells, or spring, and the question centered on the distance of water sources from the nearest garbage dumping site or place of human waste disposal. In this paper, by our definition, the water source is safely managed if the distance from it to the nearest dumping site or place of human waste disposal is 10m and over. [13]

<Figure 6.6>

Figure 6.6 shows the national trend of the shares of households using bottled water, tap water, pump, and protected well from 1999 to 2017. The share of residents

using protected well was the largest at 34% in 1999. It, however, decreased to 18.7% in 2017 after reaching 36% in 2004. That of tap water also gradually decreased to 10.4% in 2017 from almost 20% in 2000. On the other hand, the share of bottled water increased dramatically from 0.9% in 1999 to 35.2% in 2017, which means that the share grew by 2 percentage points each year for 15 years.

<Figure 6.7>

This national trend is reflected in almost all the provinces. Figure 6.7 shows the trend in all 30 provinces. As explained earlier, we combine Kepulauan Riau, Papua Barat, Sulawesi Barat, and Kalimantan Utara into 'mother' provinces. Initially, the largest share was that of protected wells in almost all the provinces. The share of bottled water, however, grew rapidly from around 2006 and became the largest in 2017 in many provinces. The share of tap water was higher in Jakarta (47.6%), Bali (46.6%), Kalimantan Timur (46.2%), and Kalimantan Selatan (34.3%) in 1999. The share, nonetheless, decreased to 10.9% in Jakarta, 21.7% in Bali, 18.7% in Kalimantan Timur, and 27.5% in Kalimantan Selatan as of 2017.

Next, we see the total share of people having access to safe water. By our calculations using Susenas data, the national share of households with safe water services was 70.8% in 2017, which was 31.3 percentage points higher than it was in 1999 (39.5%). During the same period, the urban population share grew from 38.1% to 53 %.[14] Figure 6.8 plots the scatter of urban population rates and the share of households with safe water in 1999. White circles are districts in Jawa and Bali islands, and red ones are those of outer islands; that is, outside of Jawa and Bali islands. The diameter represents the population size of districts.

<Figure 6.8>
<Figure 6.9>

As shown in the figure, we have two groups. One group consists of districts with urban share below 50%, and the other, 90 to 100%. We find that, spreading between

10% and 90%, not all of the districts included in the latter group have higher share of safe water services. Though, 18 years later, almost all regions experienced access improvement (Figure 6.9). The shares of households with access to safe drinking water services are 60% and over in all highly urbanized regions with an urban population of 80% and over. The Figure 6.9 shows that the less urbanized group, moving rightward, also experienced improvement in the access to safe water by 2017. We can check the improvement geographically in Figure 6.10 and Figure 6.11. Not only Jawa and Bali islands but also outer islands experienced progress in the access to safe water.

<Figure 6.10>

<Figure 6.11>

(3) Human Waste Management Service

This subsection focuses on human waste management services. First, we depict the trend of shares of Indonesian households who use septic tanks (including SPAL or IPAL system), pond/rice field/river/sea, pit, and beach/garden/yard from 1999 to 2017. Figure 6.12 shows that the share of households using septic tank was the largest in 1999. It maintained the highest position during the whole period and reached around 70% in 2017.

<Figure 6.12>

<Figure 6.13>

Next, we check those trends by province. Figure 6.13 illustrates the share trends of each waste management method. Indonesia had 16 provinces where the septic tank share was already highest in 1999. In 2017, the septic tank share was largest in all 30 provinces as shown in Figure 6.13.

Third, we compare the availability of district-level basic sanitation services between 1999 and 2016. We apply WHO and UNICEF's definition of basic sanitation. According to JMP (2018), basic sanitation services are defined as using improved sanitation facilities not shared with other households. We regard septic tank, IPAL, and

8

SPAL as improved sanitation facilities, and calculate the share of households with basic sanitation service using Susenas data. By our calculations, the national share of households with basic sanitation systems was 30.4% in 1999. The share increased to 60.6% in 2016, just twice that in 1999.

<Figure 6.14>
<Figure 6.15>

In Figure 6.14, we have two groups. One group consists of districts whose urbanization rates were 90 to 100%, and almost all of their share of households with basic sanitation services were between 40% and 80% in 1999. These highly urbanized regions moved upward in 2016 as shown in Figure 6.15, but none of them reached the 100% level. The other group consists of districts whose urbanization rates were under 50% in 1999. Those regions moved toward the upper right by 2016, but most of their urbanization rates were still below 50%. Their share of households with basic sanitation services was below 80%. We can also see the access improvement in Figure 6.16 and Figure 6.17. Like the drinking water analysis, not only Jawa and Bali islands but also outer islands experienced progress in access to basic sanitation services.

<Figure 6.16>
<Figure 6.17>

(4) Garbage Disposal

This subsection discusses how daily garbage was dealt with in Indonesia from 1999 to 2014. First, Figure 6.18 illustrates the national-level share trends of households who use garbage pickup services, dump their garbage into holes or burn them, and throw garbage into rivers during the period. As shown in the figure, the share of households who dump their garbage into holes or burn them has been the largest share throughout the observed period, accounting for 60.7% in 1999 and decreasing gradually to 55.9% in 2014. On the other hand, the share of households having access to trash collection

systems was 21.9% in 1999 and 31.6% in 2014. The third answer is modified to include irrigation channels as well as lakes and sea in 2011 and 2014 respectively, which reflects a slight upward trend of 'River' after 2011.

<Figure 6.18>

Next, we examine the trend by province (Figure 6.19). Although the share of households having access to the system grew dramatically in Bangka Belitung (from 7.7% in 1999 to 47.9% in 2014),[15] almost all provinces have experienced gradual improvement of access to garbage pickup services as shown in the national-level trend.

<Figure 6.19>

Third, we compare the access to garbage pickup services between 1999 and 2014 using district-level data. Figure 6.20 depicts that over half of the households living in highly urbanized regions where the urban population rate was 90% and over had access to garbage pickup services in 1999. However, the share of households with that service was low in other regions where the urban rate was under 60%. Figure 6.21 shows that garbage pickup services were available for 80% and over of the households living in the former urbanized group. Meanwhile, the share of households with that service was still low in the latter group (under 20%) although they had an increasing urban population rate.[16] Interestingly enough, if comparing with the figures in above subsections, a third group is shown at the bottom-right corner of the figure. The three larger white circles are districts (*kabupaten*) of Bogor, Bandung, and Tangerang, which are closing in on the highly urbanized group, though lagging in access to the garbage pickup service.

<Figure 6.20>
<Figure 6.21>

10

The slow progress of spreading access to the garbage pickup service can be seen in Figure 6.22 and Figure 6.23. Garbage pickup services were only available in urban districts as compared to other services such as safe drinking water and basic sanitation services.

<Figure 6.22>

<Figure 6.23>

4 Conclusion

This paper provides information about the progress regarding the availability of safe drinking water, human waste management service, and garbage disposal service. First, by international comparison, we find that Indonesia as a middle-income country lagged other middle-income countries in access to safe drinking water and basic sanitation services. Under the circumstance, the Indonesian government set ambitious targets in its five-year development program in 2015 to provide 100% safe drinking water and basic sanitation to the people by 2019.

Next, we examine the progress using the dataset from large sized household surveys and community level census data. The share of households with safe drinking water has grown from 1999 to 2017 not only in urban regions but also in rural districts. In addition, we find that the share of households using bottled water has increased dramatically almost anywhere in Indonesia. The share of households with basic sanitation has also steadily grown in Indonesia during the same period. However, if we use the jurisdiction level of 497 districts, no district has accomplished 100% share of households with the service as of 2016. In contrast to drinking water and basic sanitation services, we find that most households in rural districts have little access to garbage pickup systems yet. Only a few urban districts provide the service to residents, while most households still dump garbage into holes or burn them.

Although we illustrated the regional improvement of Indonesian households' access to drinking water and sanitation services, we still have a lot to do. Our analysis is not sufficient as we have not accessed information on the per capita quantity of water in the study of safe drinking water, and we also did not take it into account whether septic

tanks are functioning well as expected.[17] In addition, as the Japanese experience described in Chapter 8 suggests, analysis should be made not only by administrative jurisdictions but by geographically populous areas as studied in Higashikata and Hashiguchi (2017). Moreover, in future research, we should analyze the Indonesian government's policies and evaluate their impacts on the improvement of the public services, though it depends on the availability of data.

Notes

[1] World Bank Open Data (https://data.worldbank.org) accessed on January 13th, 2019.

[2] According to Demographia (2018), which constructed an urban area dataset using satellite images for comparison under similar definitions, the urban area of Jakarta (including surrounding populous districts) is the world's second largest urban area with estimated 32.3 million people.

[3] Retrieved on January 8th, 2019 (https://washdata.org/data/household).

[4] The Indonesian statistics office (BPS) categorizes the lowest administrative unit of communities (*desa/kelurahan*) into "urban (*perkotaan*)" or "rural (*pe(r)desaan*)" based on population density, non-agricultural household share, and amenities including number of schools, hospitals, and share of households with electricity.

[5] Retrieved from World Bank Open Data (https://data.worldbank.org/).

[6] It also said Indonesia would eliminate all slums by 2019.

[7] For details, we referred to a file "Investasi Air Bersih DKI Jakarta" (retrieved from http://ptsp.jakarta.go.id).

[8] We exclude East Timor province that became independent in 1999.

[9] In this papaer, we excluded districts from our analysis if sample size (number of households) is smaller than 50.

[10] We show the results using sampling weights provided by Susenas series in this section.

[11] Susenas 2017 prepared 6 answers for the question. The second and third items in Susenas 2014 were bundled together, and IPAL was newly included.

[12] From 1999 to 2008, the items which respondents chose are as follows: 1. Garbage pickup area, then carried away, 2. Dumped in a hole/burned, 3. River, and 4. Others. From 2011, the third item includes the word "irrigation canal." In this study, we regard answer 3 as the same for all rounds, which means we might overvalue the third item after 2011.

[13] Most of the Susenas just asked whether the distance was within 10m or over.

[14] We calculated the urban population rate using Podes 1999, which was designed in preparation for the population census the following year, in accordance with the definition of urban in the 2000s. The 2017 urban population rate comes from Susenas 2017.

[15] The change of answer wording led to the sudden increase in the share of households who dumped their waste into rivers in Maluku and Maluku Utara in 2014.

[16] We used the urbanization rate of 2016 instead of 2014 due to lack of data.

[17] JICA (2017) reports that most septic tanks in Indonesia did not cover gray water (domestic wastewater from kitchen, bathroom, washing machine, and so on). Furthermore, the capacity of septic tanks is not sufficient to keep the environment clean.

References

Demographia. 2018. "Demographia World Urban Areas: Built-Up Urban Areas or Urban Agglomerations, 14th Annual Edition." (downloaded from http://demographia.com/db-worldua.pdf on 22nd December, 2018.)

Higashikata, Takayuki, and Yoshihiro Hashiguchi. 2017. "The Causal Effect of Urbanization on Rural Poverty Reduction: Quasi-Experimental Evidence using Indonesian Urban Area Data." Institute of Developing Economies (IDE-JETRO), IDE Discussion Paper 673.

Japan International Cooperation Agency (JICA). 2017. "Feasibility Survey with the Private Sector for Utilizing Japanese Technologies in ODA Projects: Introducing Decentralized Domestic Wastewater Treatment System of Johkasou for Public Building (in Japanese)." Japan International Cooperation Agency (JICA).

Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). 2011. "Dkinking Water: Equity, Safety and Sustainability." World Health Organization (WHO) and the United Nations Children's Fund (UNICEF).

Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). 2018. "JMP Methodology: 2017 Update & SDG Baselines." World Health Organization (WHO) and the United Nations Children's Fund (UNICEF).

Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional (KPPN/Bappenas). 2014. "Rencana Pemerintah Jangka Menengah Nasional [National Medium-term Development Plan] 2015-2019." Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional.

United Nations Human Settlements Programm (UN-HABITAT). 2016. "Urbanization and Development: Emerging Futures (World Cities Report 2016)." United Nations Human Settlements Programm (UN-HABITAT).

Figure 6.1: Urbanization Rate by District in 2010
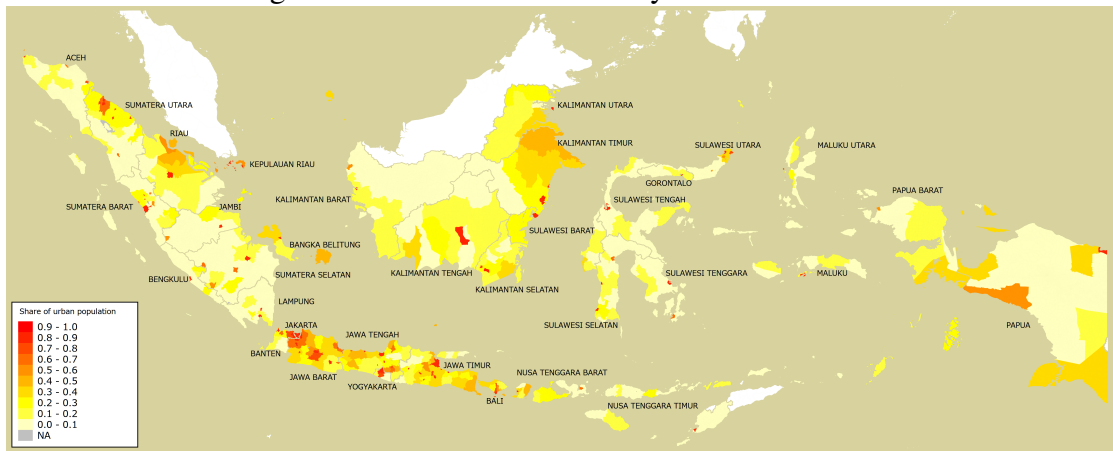
Notes: The Urbanization rate is based on our calculation using 2010 population census.

Figure 6.2: Access to Basic Drinking Water Services and Urbanization (2015)
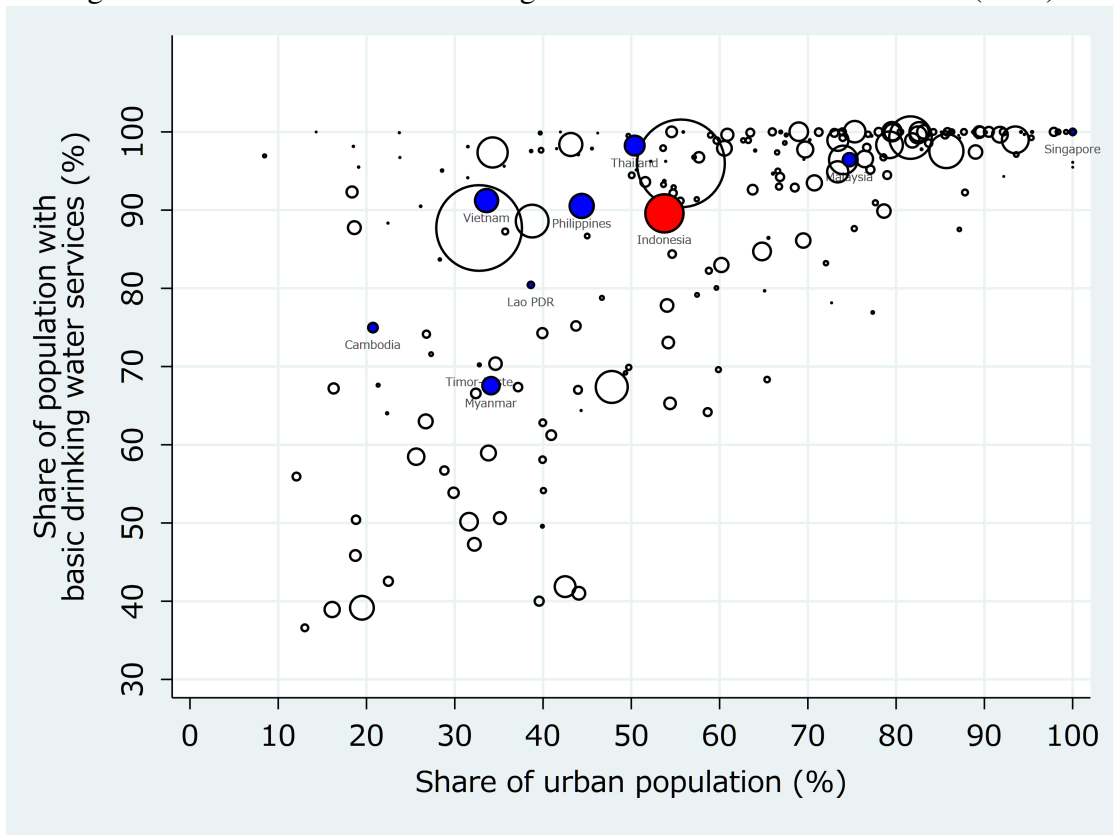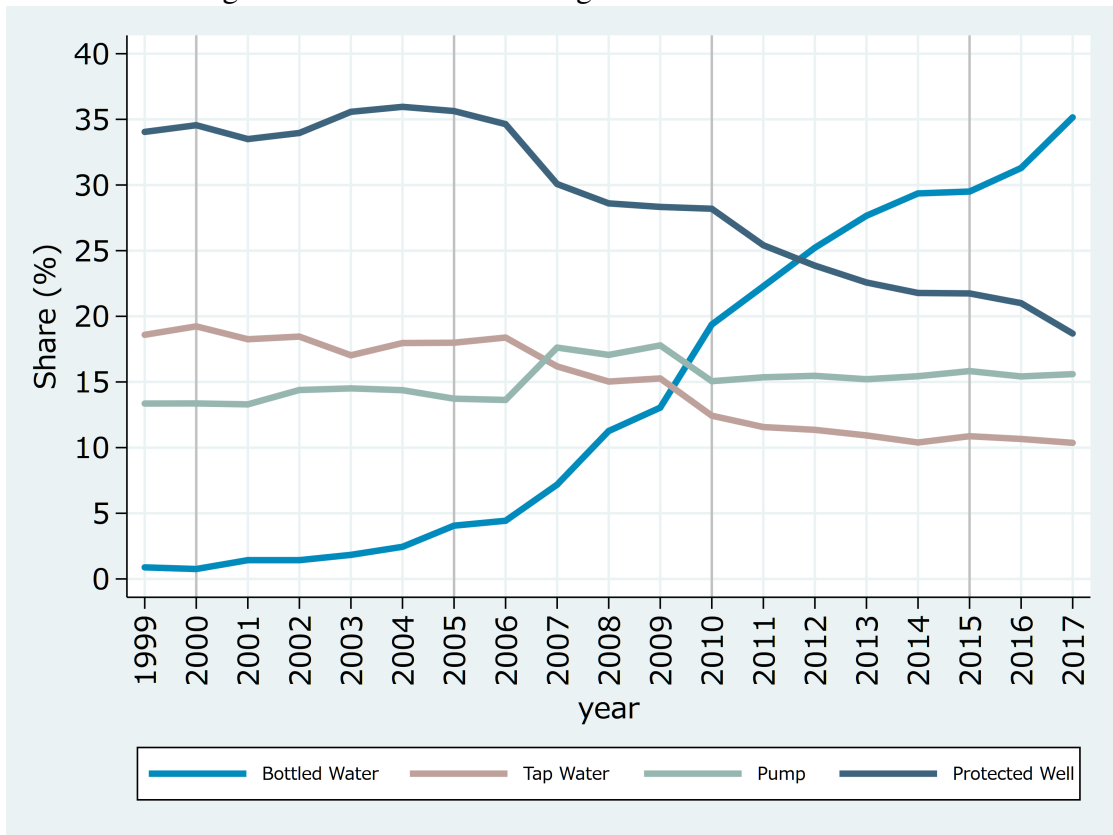

Notes: Circle sizes represent population size. See Section 2 for data sources.

Figure 6.3: Access to Basic Drinking Water Services and per capita Income (2015)
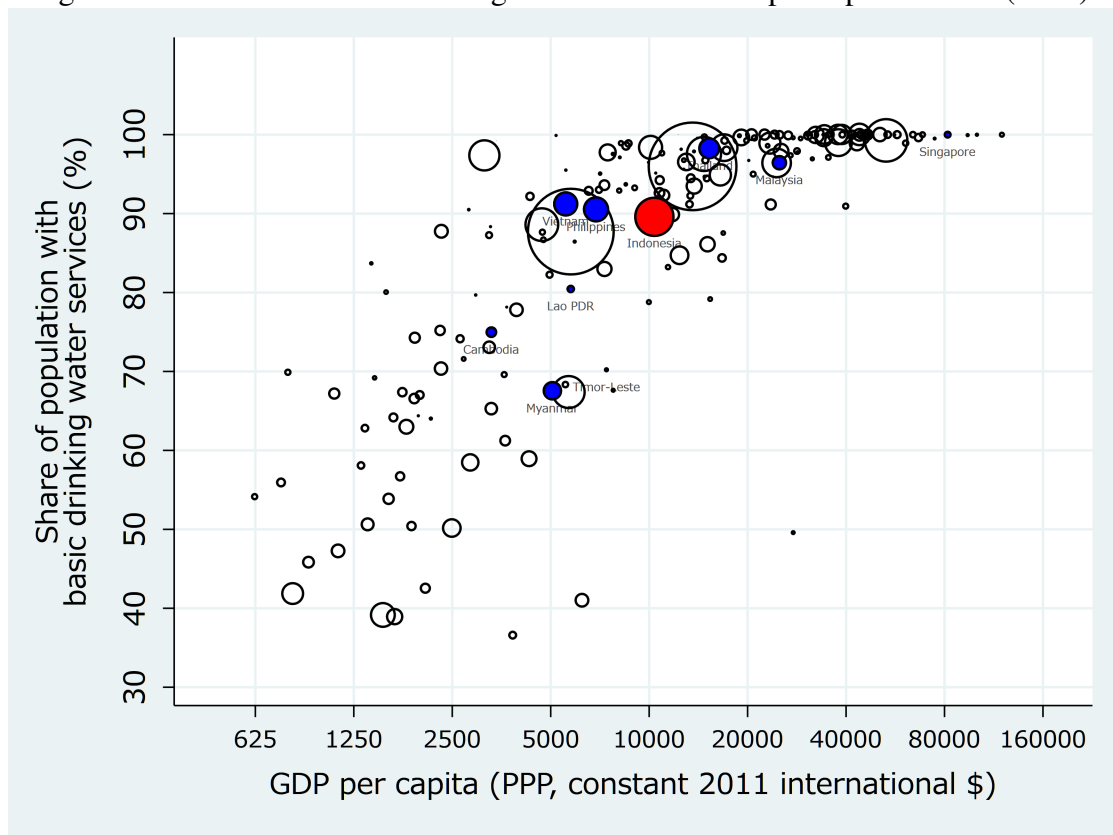
Notes: Circle sizes represent population size. See Section 2 for data sources.

Figure 6.4: Access to Basic Sanitation Services and Urbanization (2015)
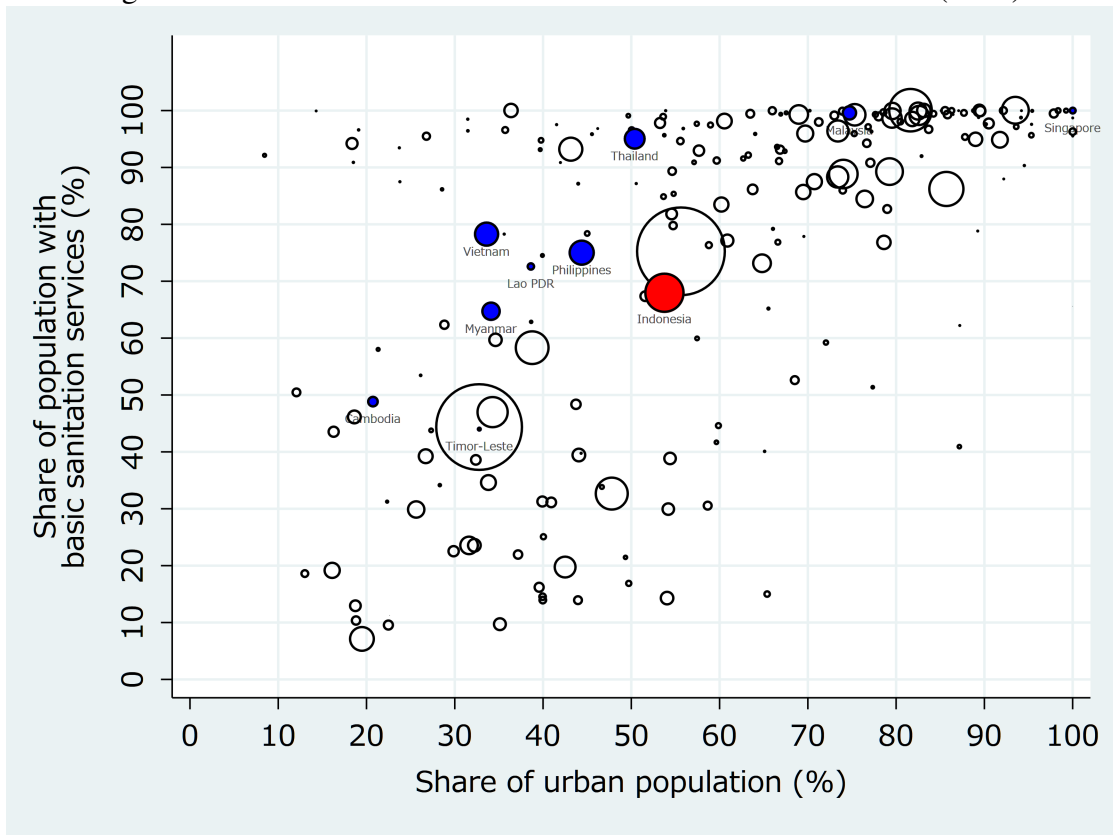
Notes: Circle sizes represent population size. See Section 2 for data sources.

Figure 6.5: Access to Basic Sanitation Services and per capita Income (2015)
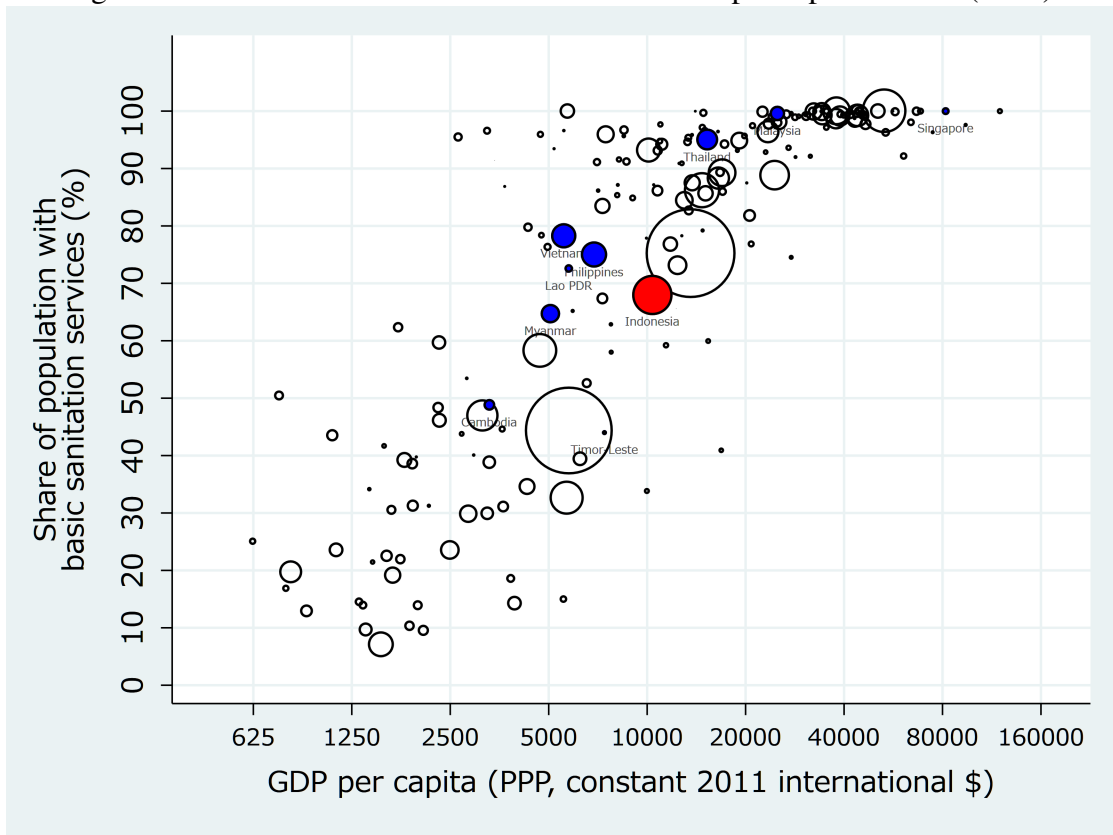
Notes: Circle sizes represent population size. See Section 2 for data sources.

Figure 6.6: Source of Drinking Water from 1999 to 2017

Notes: See Section 3 for data sources.
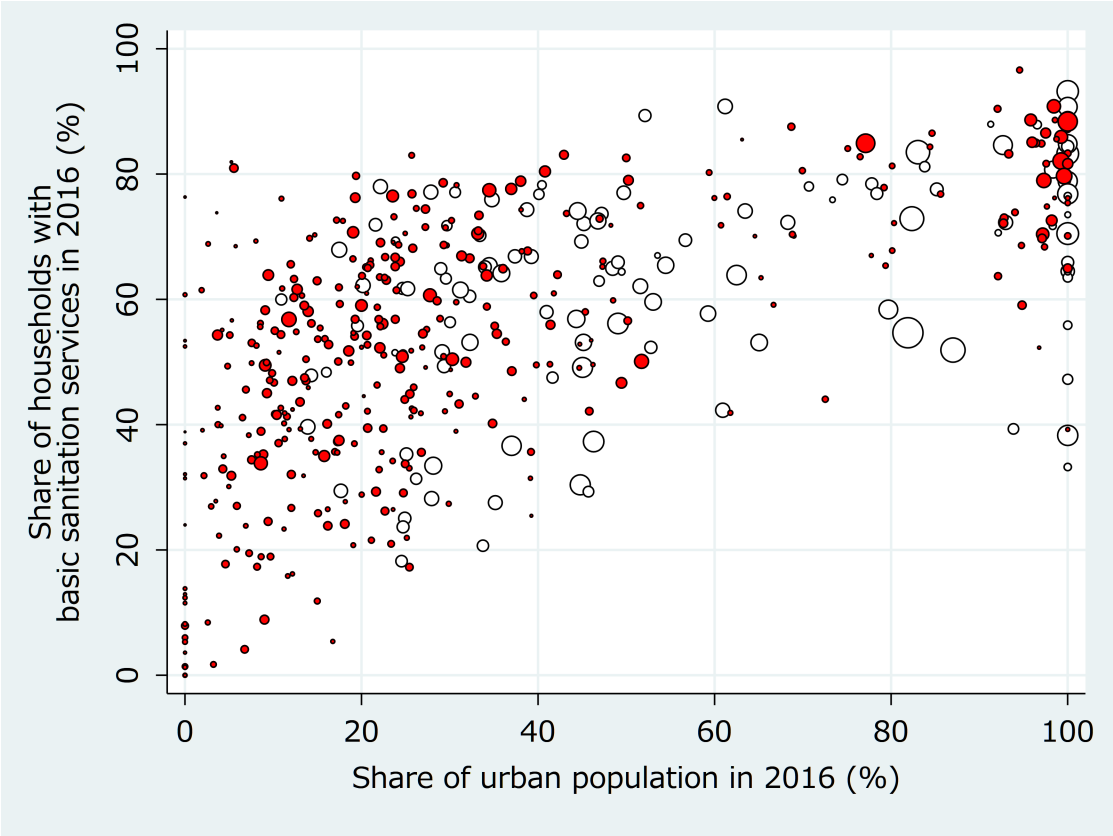
Figure 6.7: Source of Drinking Water by Province
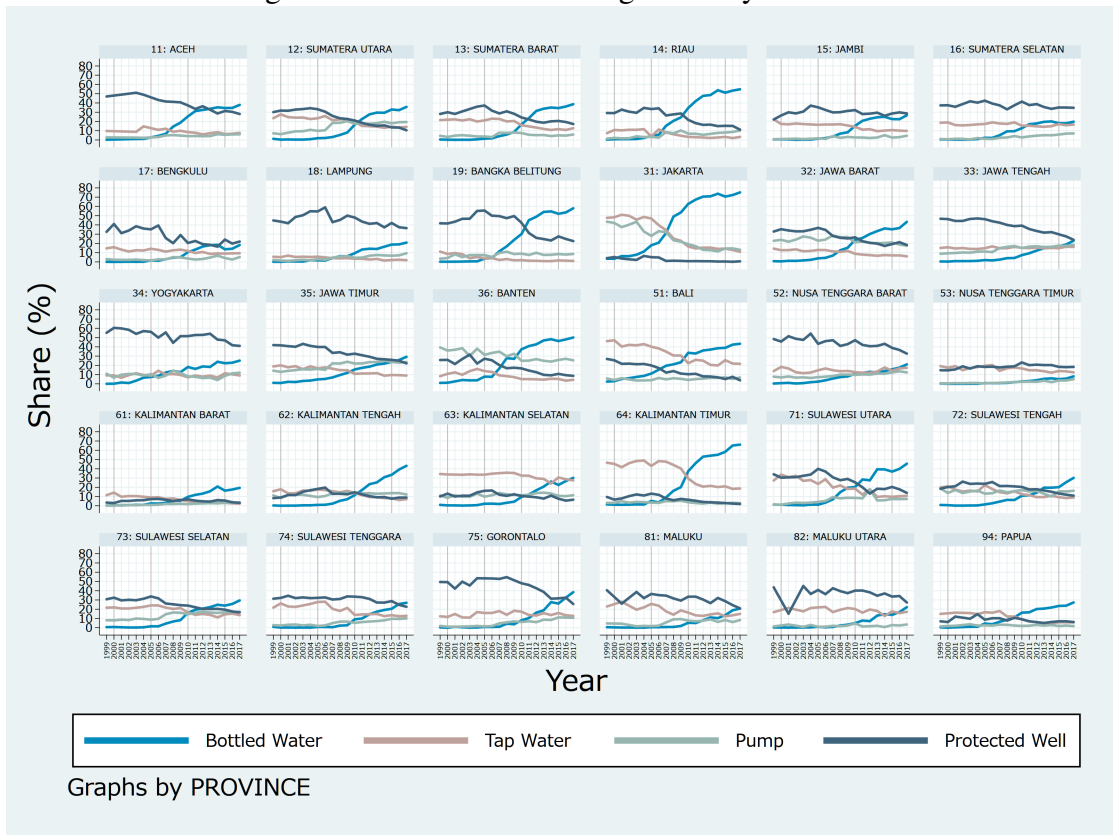
Notes: See Section 3 for data sources.

Figure 6.8: Share of Households with Safe Drinking Water and Urbanization (1999)
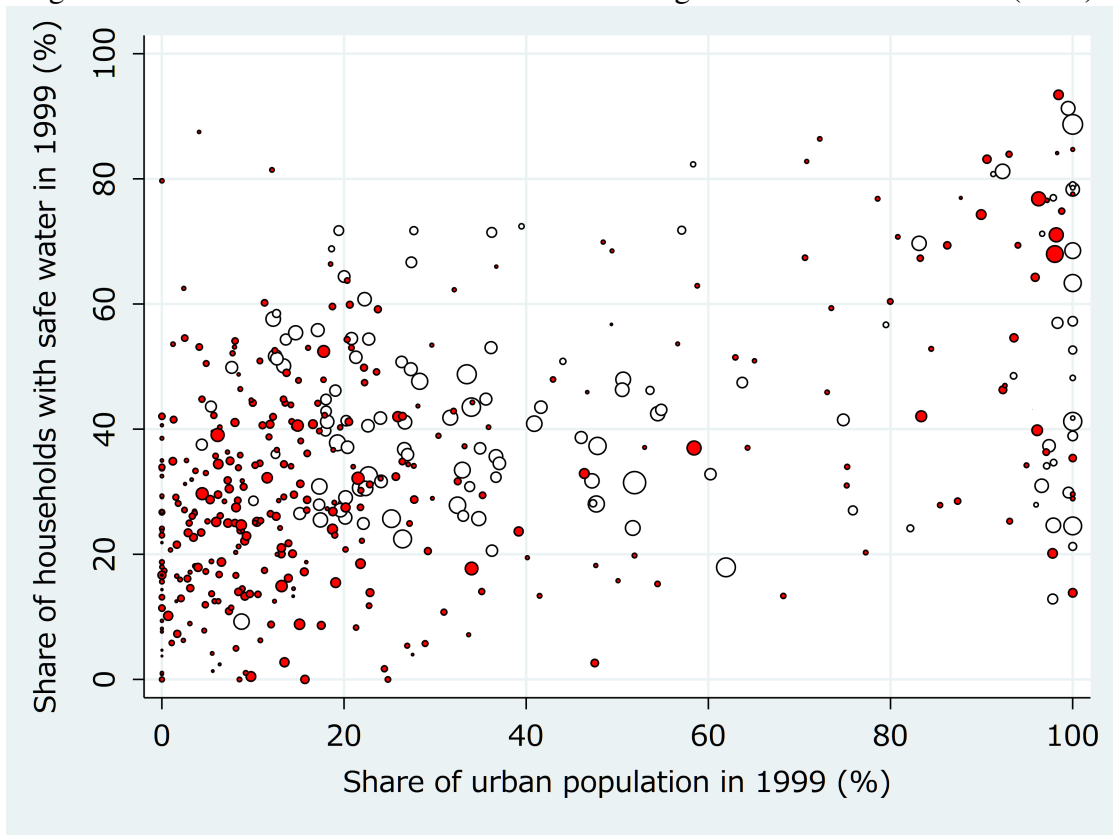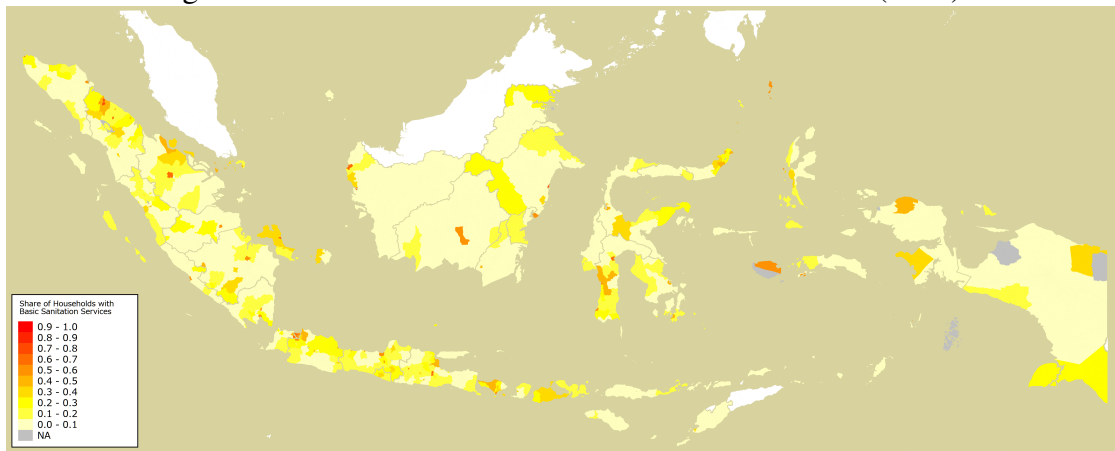

Notes: Circle sizes represent population size. White ones are districts in Jawa and Bali islands. Red ones are the rest. See Section 3 for data sources.

Figure 6.9: Share of Households with Safe Drinking Water and Urbanization (2017)
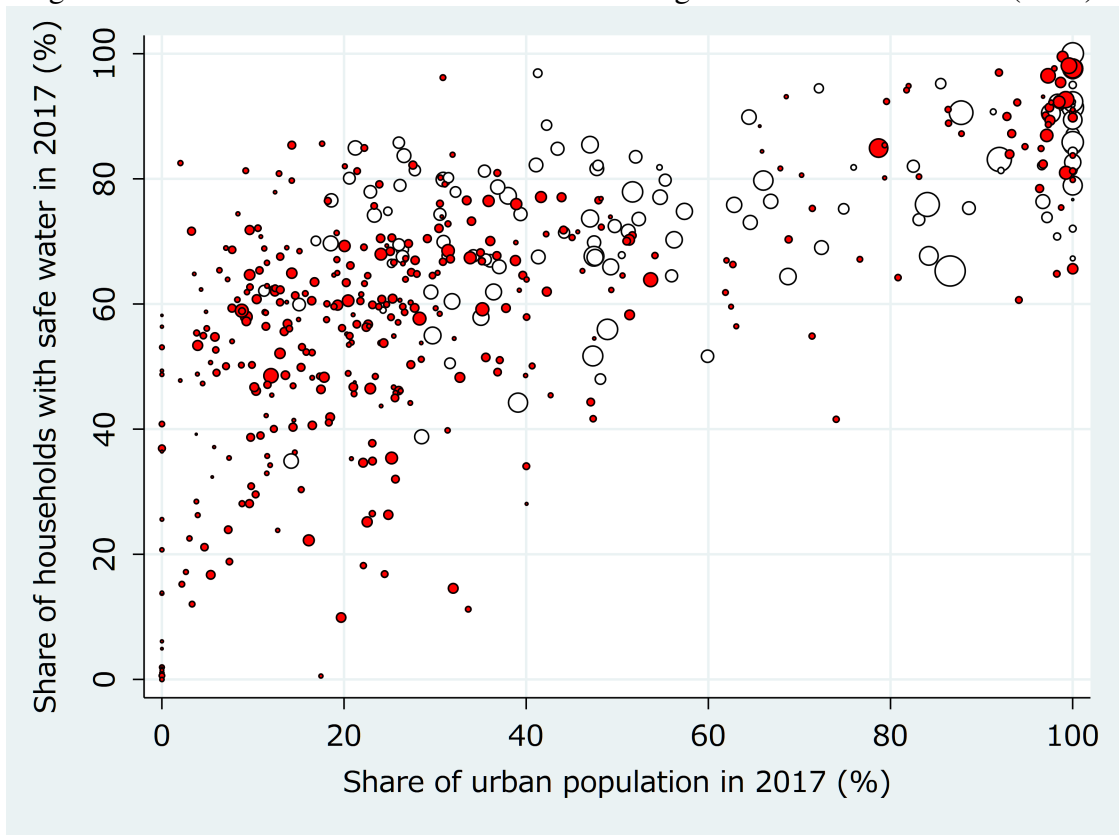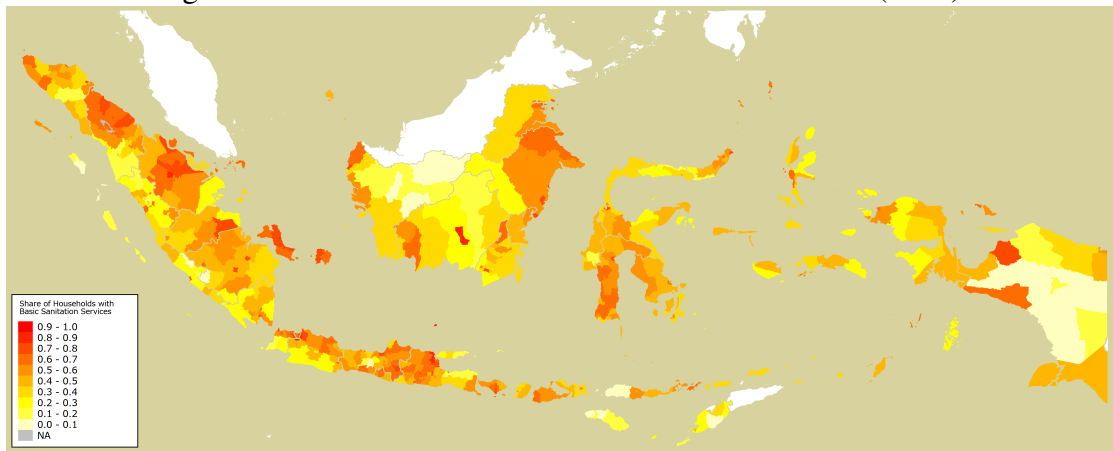

Notes: Circle sizes represent population size. White ones are districts in Jawa and Bali islands. Red ones are the rest. See Section 3 for data sources.

Figure 6.10: Share of Households with Safe Drinking Water (1999)
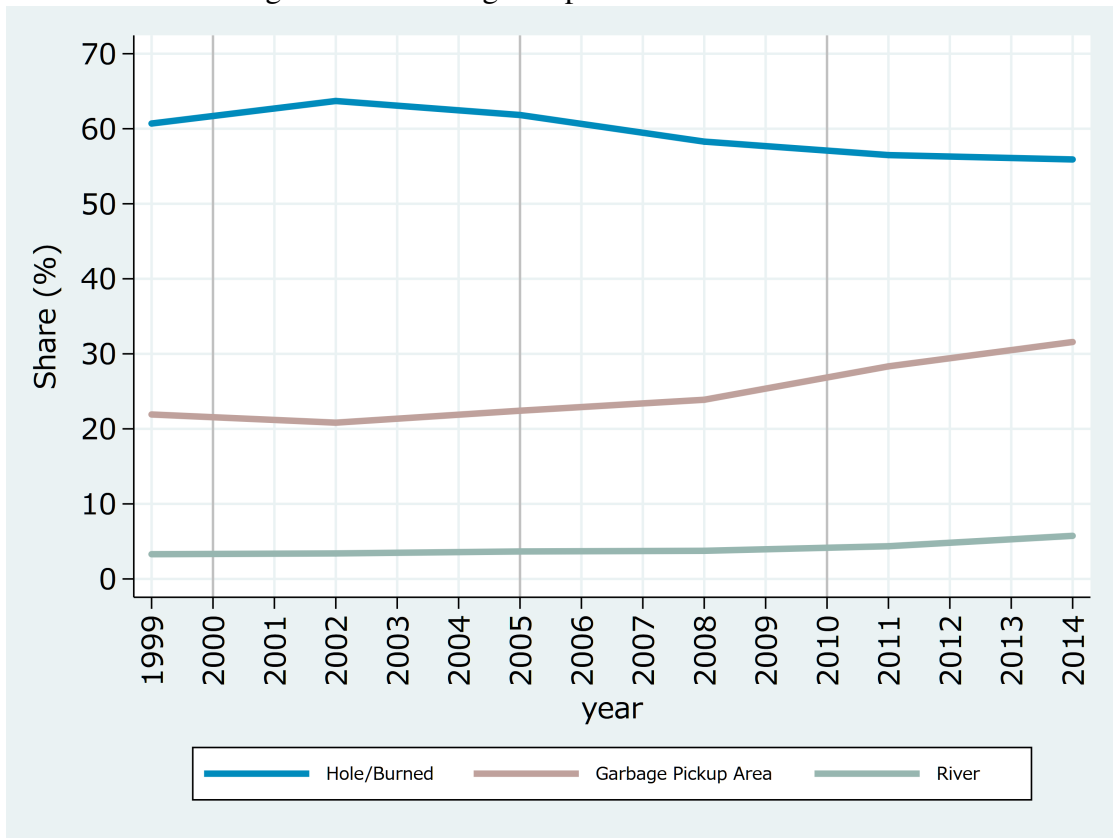

Share of Households with Safe Water

0.9 - 1.0
0.8 - 0.9
0.7 - 0.8
0.6 - 0.7
0.5 - 0.6
0.4 - 0.5
0.3 - 0.4
0.2 - 0.3
0.1 - 0.2
0.0 - 0.1
NA
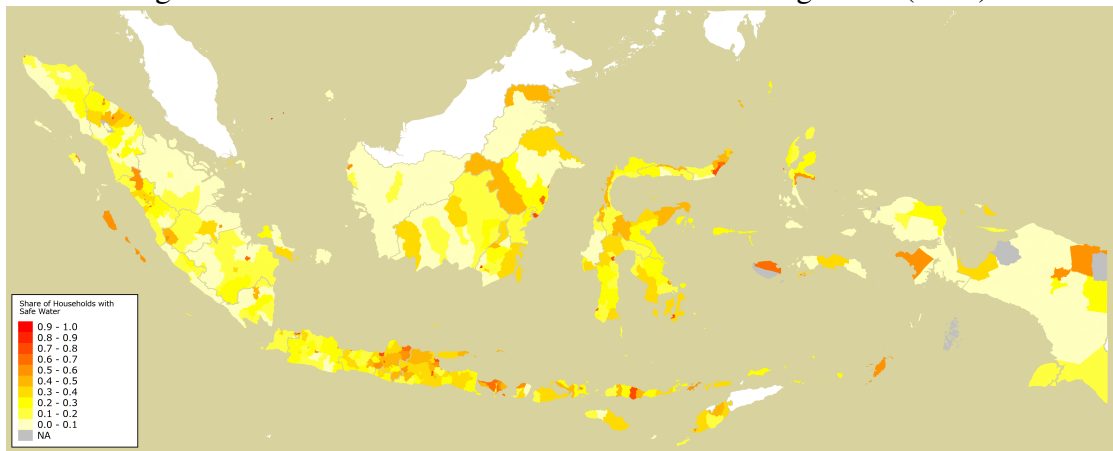
Notes: See Section 3 for data sources.

Figure 6.11: Share of Households with Safe Drinking Water (2017)
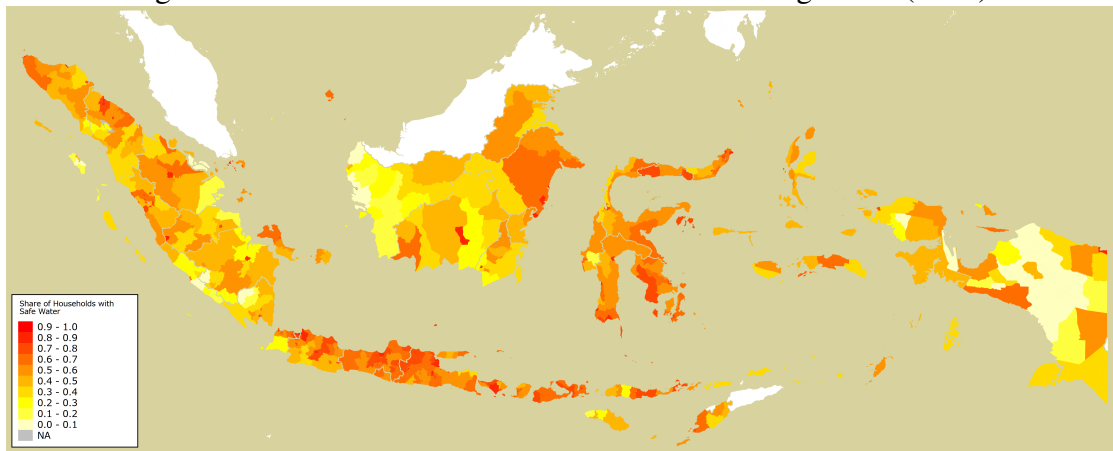
Notes: See Section 3 for data sources.

Figure 6.12: Human Waste Management Service from 1999 to 2017
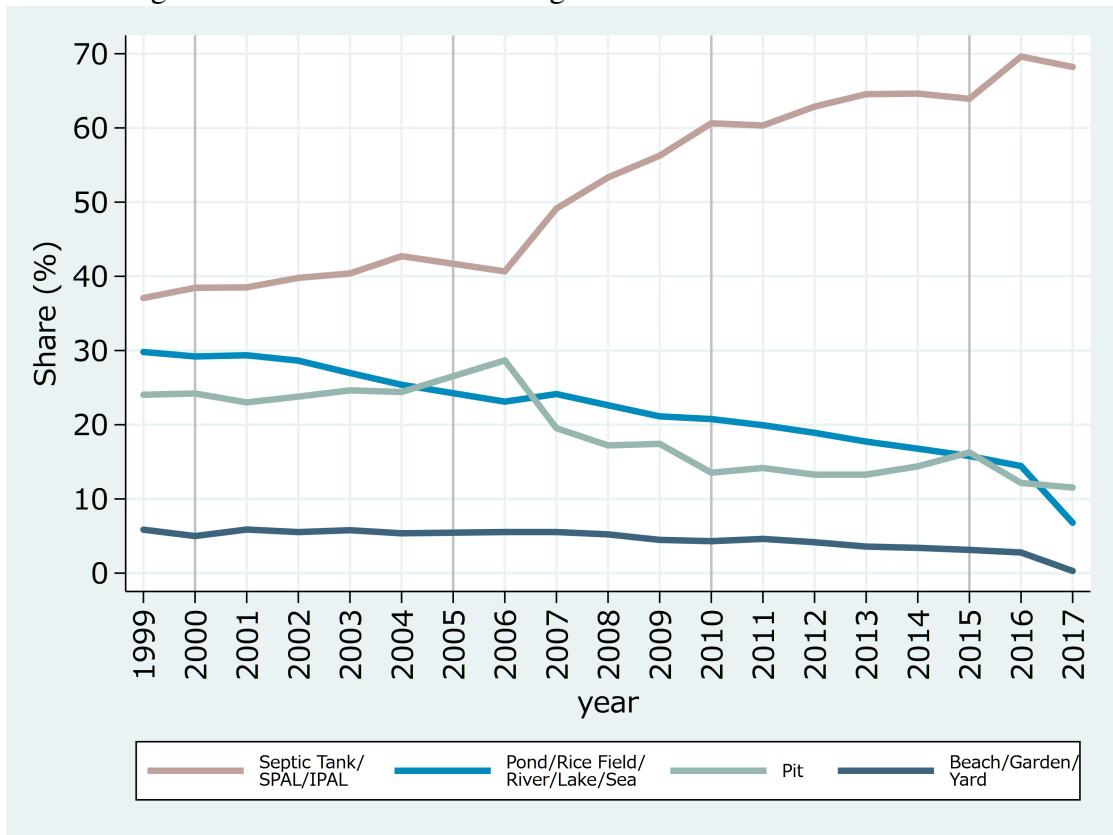
Notes: See Section 3 for data sources.

Figure 6.13: Human Waste Management Service by province
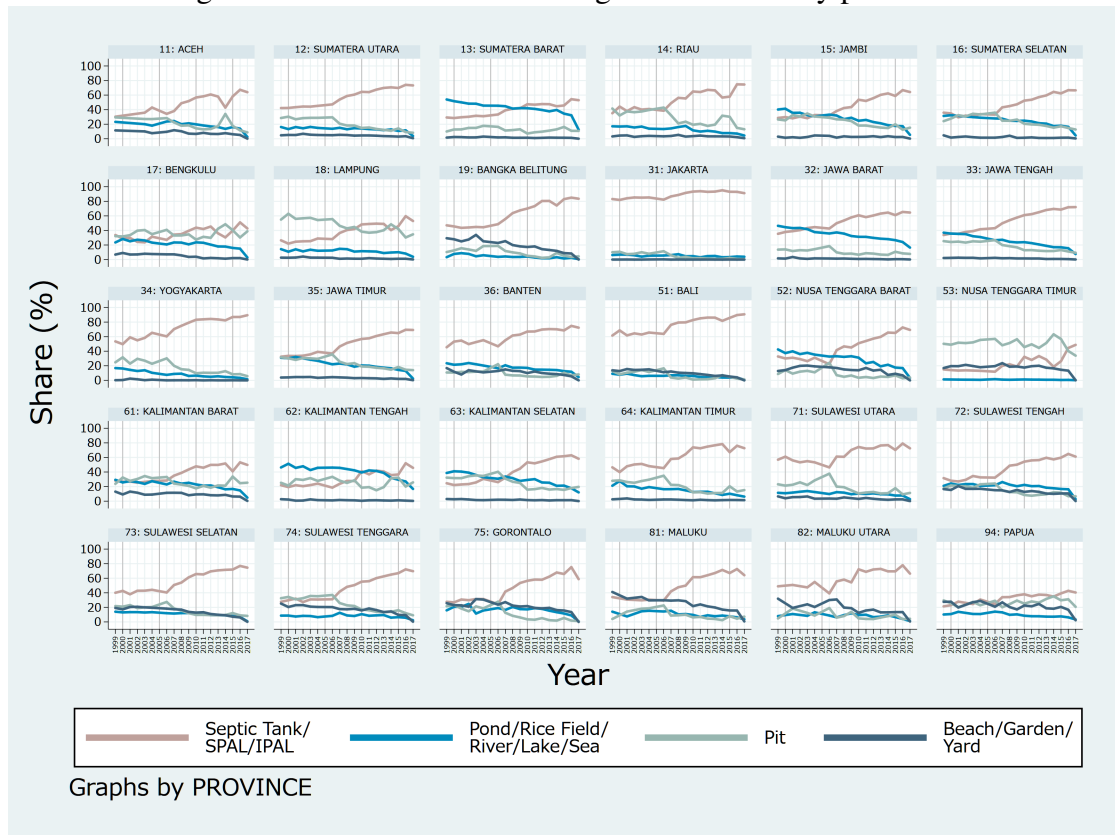
Notes: See Section 3 for data sources.

Figure 6.14: Share of Households with Basic Sanitation Services and Urbanization (1999)
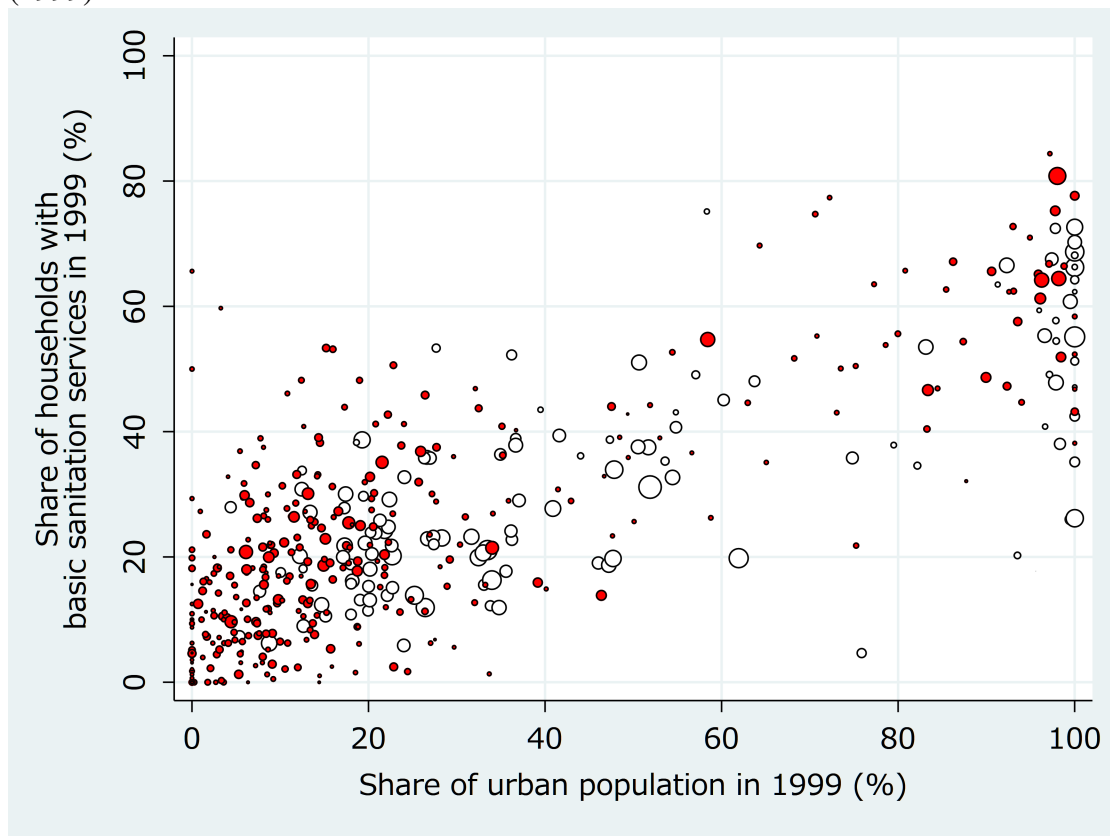
Notes: Circle sizes represent population size. White ones are districts in Jawa and Bali islands. Red ones are the rest. See Section 3 for data sources.

Figure 6.15: Share of Households with Basic Sanitation Services and Urbanization (2016)

Notes: Circle sizes represent population size. White ones are districts in Jawa and Bali islands. Red ones are the rest. See Section 3 for data sources.

Figure 6.16: Share of Households with Basic Sanitation (1999)

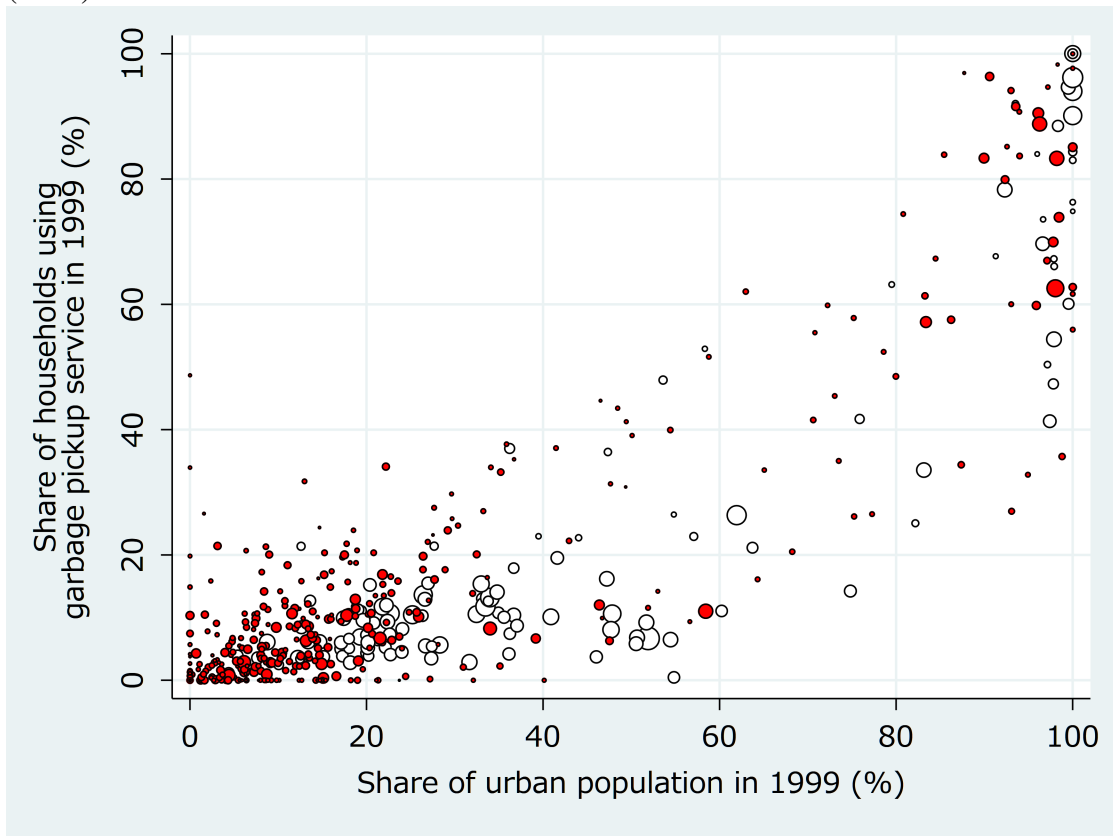Notes: See Section 3 for data sources.

Figure 6.17: Share of Households with Basic Sanitation (2016)

Notes: See Section 3 for data sources.

Figure 6.18: Garbage Disposal from 1999 to 2014

Notes: See Section 3 for data sources.
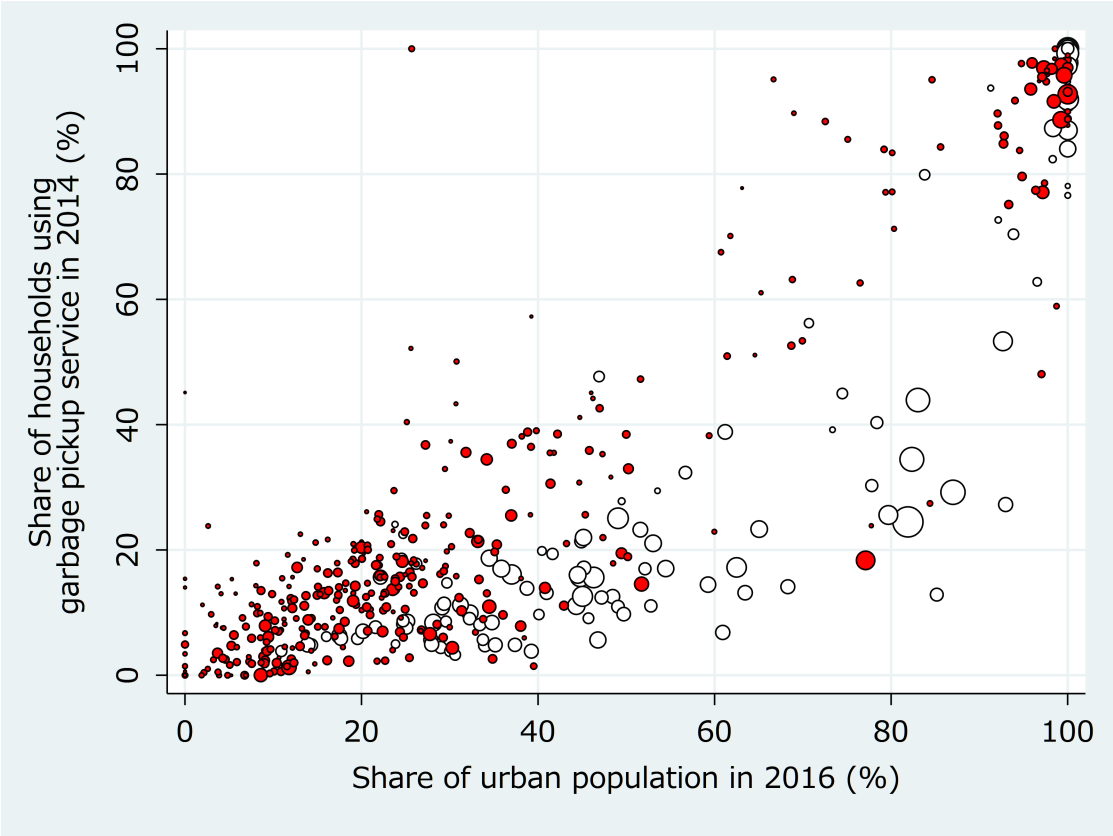
Figure 6.19: Garbage Disposal by Province
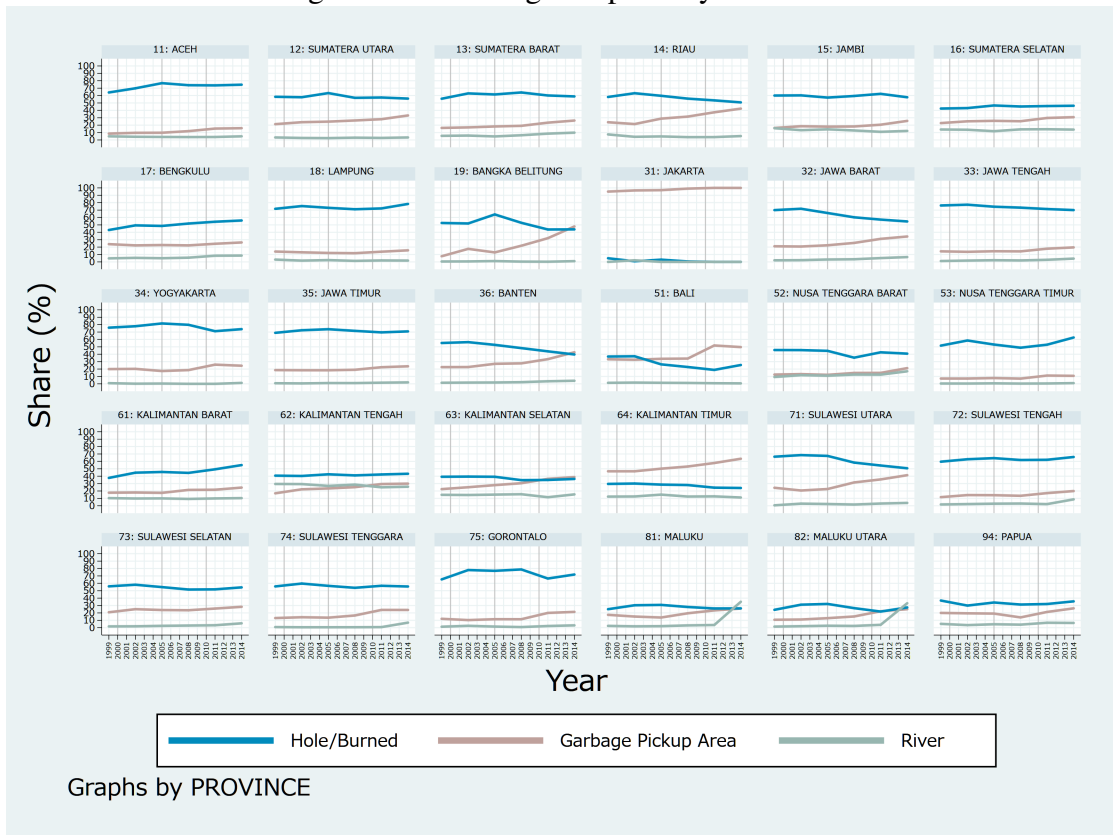
Notes: See Section 3 for data sources.

Figure 6.20: Share of Households with Garbage Pickup Service and Urbanization (1999)


Notes: Circle sizes represent population size. White ones are districts in Jawa and Bali islands. Red ones are the rest. See Section 3 for data sources.

Figure 6.21: Share of Households with Garbage Pickup Service and Urbanization (2014)
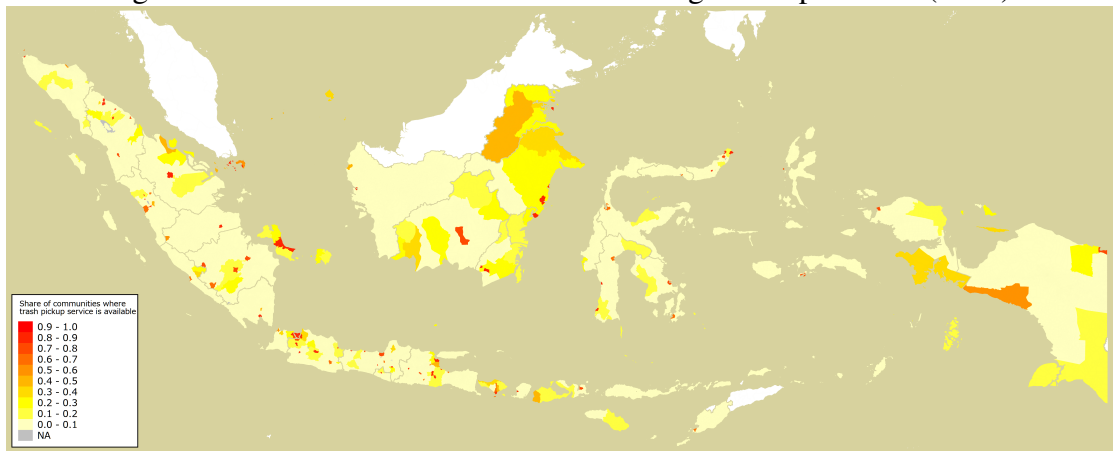

Notes: Circle sizes represent population size. White ones are districts in Jawa and Bali islands. Red ones are the rest. See Section 3 for data sources.

Figure 6.22: Share of Households with Garbage Pickup Service (1999)
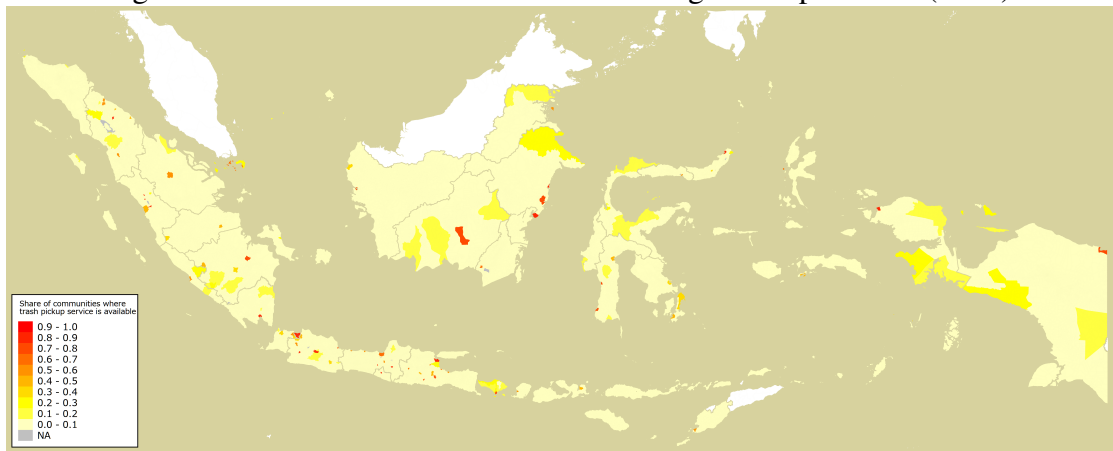
Notes: See Section 3 for data sources.

Figure 6.23: Share of Households with Garbage Pickup Service (2014)

Notes: See Section 3 for data sources.