A Review of the Energy-employment Nexus in Bangladesh: Rural-urban Electrification and Sectoral Occupation Patterns

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Abstract

Energy access, more specifically electricity access, is one of the prerequisites to achieve the Sustainable Development Goals. Around one-tenth of the global population remained without access to electricity in 2019. Bangladesh has shown substantial progress in electricity access. This paper aims at reviewing the association between electricity access and employment in the core three sectors: agriculture, industry, and service. The study finds that rural access to electricity is steeper in progress than that of urban areas; and overall access to electricity is increasing, while the urban-rural disparity in energy access is decreasing over time. The proportion of female employment in agriculture has reduced by one third during 1991–2018. Agricultural employment, in general, decreases with an increase in electricity access,

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which is counterintuitive. The government should consider the issue to keep the agricultural employment stable to ensure food security and the sector's contribution to gross domestic product.

Keywords: Energy access, employment, urban, rural, Bangladesh.

1 Introduction

We are living at a moment of global energy transition. Energy access is an intractable challenge, and a prerequisite for achieving the United Nations (UN) Sustainable Development Goals (SDGs), which aim to support broad-based, equitable social and economic development (Riva et al., 2018; Pode, 2013). Despite substantial progress achieved in raising electricity connectivity rates in many global regions in recent years, some 10% of the worldwide population remained without access in 2019, which was around 770 million in number, representing a decrease from nearly one billion people in 2017 (International Energy Agency [IEA], 2020). It is acknowledged that binary indicators for measuring energy access levels are not only inadequate but at times can even result in deceptive policy recommendations (Groh et al., 2016). Nonetheless, as long as efforts to measure energy poverty more comprehensively have not led to a uniform set of indicators which is more widely accepted, the binary metrics remains the measurement tool of choice, including for SDG 7.1 (Pelz et al., 2019).

The global population without access to reliable electricity is spatially concentrated primarily in sub-Saharan Africa, followed by parts of South and Southeast Asia (except China, India, and Indonesia), as well as war-torn nations like Afghanistan, Syria and Yemen (IEA, 2019; Azimoh et al., 2016). There is also a visible gap of around 17% between global urban and rural electricity access, while in few countries the gap is substantially higher, for instance 56% in Myanmar (IEA, 2019). Groh (2014) has further empirically investigated, based on data from Peru, that the lack of access to electricity might cause a trap that is delaying (rural) development at the household level or even prohibiting the development path, ultimately hindering economic development. Electricity access and 'modern' fuel access has by now become a key priority for policymakers, planners and elected officials as a means to promote socio-economic development in the poorest countries and regions (Khan and Arsalan, 2016). Energy sector goals and associated infrastructure are also pivotal in many governments' strategies to legitimize supremacy across their territories, enabling the government to forge connections with citizens while symbolizing the nation and the promise of modernity (Abram et al., 2019; Degani et al., 2020).

The South Asian nation of Bangladesh has shown remarkable progress in improving electricity access levels, which reached 93% nationally by 2019 (GOB, 2019). Overall access to electricity nearly quadrupled in last twenty years. Yet, a persistent gap between urban and rural access to electricity remains visible, which was 93% and 77%, respectively, in 2019 (IEA, 2020). To address lagging rural access levels, the state has launched a range of initiatives, including deploying micro-generation and "islanded" or isolated systems, such as village-scale mini-grids, or stand-alone solar photovoltaic (PV) panels, installed within households and small enterprises to provide lighting and other basic energy services. The persistent barriers to expanding rural electrification include high initial investment requirements in transmission and distribution equipment and infrastructure, inadequate power generation capacity in certain regions, growing frequency of flooding and other disasters, and distribution challenges for spatially-dispersed populations, against low expected uptake levels on the demand side (Komatsu et al., 2011). Small-scale, distributed renewable energy technologies (RETs) have enabled under-serviced, low-demand consumers to access electricity across multiple and diverse physical geographies (Laufer and Schafer, 2011; Palit, 2013; cf. Bew-Hammond, 2010; Castán Broto et al., 2018).

Recent studies on energy access have examined its importance in specific services and sectors, including healthcare provision in energy-poor countries and regions (Castán Broto and Kirshner, 2020), quality of life and wellbeing (Rao et al., 2019), communications and rural connectivity (Parks, 2016), and energy for displaced people and refugees (Huber and Mach, 2019), along with the connections between energy access and disaster resilience and recovery (Sharma, 2019). Energy research has furthermore examined competing definitions of what constitutes energy 'access' in diverse contexts (Pachauri, 2011; Groh et al., 2016; Pelz et al., 2019), connections between energy access and wider energy transitions nationally and globally (Sokona et al., 2012), descriptive and causal analysis regarding solar energy and rural development (Pachauri et al., 2012; Rahman and Ahmad, 2013; Groh, 2014), and the persistent presence of high-carbon or 'dirty' sources of energy, such as coal, in the energy mix of emerging economies (Dorband, et al., 2020; Gellert and Ciccantell, 2020). Furthermore, researchers have carried out studies of low-carbon consumer renewables, such as SHS as a poverty reduction strategy in Sri Lanka (Laufer and Schafer, 2011) and Bangladesh (Mondal et al., 2010; Hasanuzzaman et al., 2015; Chowdhury et al., 2015;

Groh et al., 2016; Dumitrescu et al., 2020; Dumitrescu et al., 2022; Groh et al., 2022), along with the socio-economic impacts of renewable energy services in villages, towns and localities in the Philippines and South Africa (Azimoh et al., 2015; Macabebe et al., 2016). Recently, Amin et al. (2022) have undertaken research outlining the development of Bangladesh's energy sector while transiting from a least developed country to a lower middle-income country within five decades since independence in 1971, including bringing access to electricity from 3% in 1971 to nearly 100% today.

Few researchers have explored the specific relationships between levels of energy access and local and national-scale labour markets and employment outcomes. Yet, studies regarding local job creation resulting from improvements in energy provision and access remain understudied (Bryan et al., 2017). Against this backdrop, this review emphasizes on the energy-employment nexus, exploring the implications of Bangladesh's rural and urban electrification on sectoral employment patterns. Since the application of linear cause-and-effect relationship is not sufficient to describe or predict electricity access and development outcomes (Riva et al., 2018), a qualitative review is likely to generate a platform for further in-depth research in Bangladesh.

2 Bangladesh: Economy and Energy in Brief

An emerging and multi-ethnic nation, Bangladesh hosts one of the world's largest river deltas, the Ganges-Brahmaputra delta. With a total population of 162.7 million (BBS, 2019) in an area of 147,570 km^2 Bangladesh is among the most densely populated countries globally; it is also ground zero for some of the worst effects of climate change, given its low-lying and heavily populated coastal areas (see Figure 1). According to the latest Population and Housing Census of 2011, the rural population exceeds its urban counterpart, with an approximately 75% to 25% rural-urban split (BBS, 2019).

According to the *Bangladesh Economic Review 2019*, the country has experienced a declining share of agriculture in its gross domestic product (GDP) during the past three decades, with a corresponding rise in the industrial share in GDP. Among food grains, production of rice varieties is relatively stable in quantity with little ups and downs; wheat production increased by 50%, and maize production has more than doubled in 2016–17 compared to the levels reported in 2008–09. The service sector correspondingly shows a flat, level trend. Annual GDP growth has exceeded 6%, reaching 7% in the four years since 2015–16, benefitting the Bangladeshi

Figure 1 Map of Bangladesh.

economy as whole despite being highly unequally distributed, while the industrial manufacturing sector plays a growing role. Notably, the Gini coefficient was 27.6 in 1991 and 32.4 in 2016 with little rise during 1995–2005 (World Bank, n.d.). The contribution of the broad agricultural and service sector has seen a flatter trend in GDP since 2015–16, with growth of 3.5% and 6.5% in 2018–19 respectively (GOB, 2019).

Bangladesh experienced a quantum leap during the 2003 to 2007 period in foreign direct investment (FDI) measured as percentage of GDP, while for other years it shows a comparatively stable trend (Sengupta and Puri, 2020). To attract FDI, along with encouraging the domestic investment, the Bangladesh Economic Zone Authority (BEZA) has initiated a program for job creation of around 10 million people in 100 private and public economic zones (EZs) in multiple, greenfield locations spanning the country by 2030, seeking to unlock potential economic growth. For instance, Mongla EZ is dedicated for Indian state-led and private investors under the government-to-government (G2G) arrangement, while the Natore EZ, a district in the northwest, is dedicated for agro food process (see the annexure for details) (BEZA, 2020). Furthermore, the national Parliament approved the One Stop Service Act 2018, aiming to provide simplified and more rapid services to domestic and foreign investors, (GOB, 2019), particularly to facilitate their engagement in these zones as a new form of 'infrastructural space' (see Easterling, 2014).

In the energy sector, Bangladesh has achieved substantial progress in recent years. Currently, the total grid-based installed capacity is about 24,000 MW, in which renewable sources count for 776 MW. Approximately 28 million people in Bangladesh lack access to electricity (IEA, 2020). Further, the captive and renewable energy capacity exceeded 3,000 MW. The performance of the electricity sector has improved through reducing the system loss (including to theft) to around 8.5% in 2020–21 from around 12% in 2013–14 (BPDB, 2022). That central government's long-term vision of reaching 24,000 MW by 2021, 40,000 MW by 2030, and 60,000 MW by 2041 appears feasible, though the first milestone has not been achieved, given large-scale production facilities, including nuclear power along with 53 power plants in stages of construction (GOB, 2019). It is to note that most of the plants, being coal-based, were struggling to find financiers, and eventually many of the plans were cancelled. Construction of the first nuclear reactor in Rooppur, Ishwardi Upazila in Pabna District started in November 2017, and the second unit began in July 2018, with support from the Russian Government. It is expected to be commissioned in 2023 (WNA, 2020; MOST, 2018). These units are expected to create some employment opportunities. However, the Covid-19-triggered loss on GDP can worsen the unemployment condition to a large extent as six million new people may become jobless (Kamal and Kamal, 2020).

Bangladesh imports electricity from India, and there are further initiatives to import from Myanmar, Bhutan, Nepal and China. The distribution channel is managed by six different organizations.[1] The Government of Bangladesh (GoB) set up the Sustainable and Renewable Energy Development Authority (SREDA) in 2014, under the Sustainable and Renewable Energy Development Authority Act of 2012, to facilitate the expansion of sustainable energy services for greater access levels. Currently, some 572.63 MW electricity is produced from renewable sources, and 543.08 MW capacity of renewable projects are under construction (GOB, 2019). A 50-MW solar park in Mymensingh district is already connected to the national grid (Dhaka Tribune, 22 December 2020). Installed hydro power constitutes 1.28% of total installed capacity; several observers have argued that potential of wind and hydroelectric generation is relatively limited (Gulagi et al., 2020; GOB, 2019). Although SREDA was created as a nodal agency, the agency lacks the status of a ministry, as it is the case in other countries in the region, e.g. India‘s Ministry of New and Renewable Energy (Amin et al. 2022). On average, SREDA only received USD 0.73M from 2015 to 2020 (SREDA, 2020), a mere 0.03% of total governmental allocation. Originally, as per the Renewable Energy Policy of 2008, the GoB had set a target to generate 5% of the total electricity supply from renewable energy resources by 2015 and 10% by 2020. However, currently renewable energy sources only represent about 3% of the total electricity production. As part of it, Nationally Determined Contributions (NDC) commitment during the recent COP26 in Glasgow, the GoB committed to generate 4,100 MW of renewable energy by 2030 (while aiming to lift total generation capacity to 46,00 MW, this would represent 9% of the total electricity mix), and targets 40% electricity from renewables by 2050.[2]

[1]These include Bangladesh Power Development Board, Bangladesh Rural Electrification Board, Dhaka Power Distribution Company, Dhaka Electric Supply Company, West Zone Power Distribution Company and Northern Electricity Supply Company Limited.

[2]More information can be found here: https://unb.com.bd/category/Bangladesh/planning-to-generate-40-percent-electricity-from-renewable-sources-by-2050-nasrul-hamid/79449, and here: https://www.thedailystar.net/business/economy/news/target-generate-4100mw-2030-2210291.

3 Access to Energy

Overall, energy access in Bangladesh increased from 14.29% in 1991 to 85.16% in 2018, almost a six-fold rise in just 27 years. According to the latest Census 2011, there were 31.71 million households, with 6.17 and 25.54 million in urban and rural areas, respectively. The number of residential dwellings by type and sources of lighting in 2011 are shown in Figure 2. Out of a total 6.17 million urban households, 5.47 million had electricity access for lighting, while only 27.81 thousand households had lighting powered by solar energy. In contrast, out of 25.54 million rural households, nearly half (12.47 million) had electricity for lighting whereas 1.02 million households had solar PV-powered lighting (BBS, 2015).

The urban and rural trajectories diverge, with both of these increasing during the period under study, yet at different rates (Figure 3). Urban access to electricity was 58.06% in 1991, jumping to 97.08% in 2018. In contrast, only an estimated 3.17% of the rural population had access to electricity in 1991, and increasing steadily to 78.26% by 2018, a 25-fold increase in 27 years. If the pace of upsurge remains the same for both urban and rural electricity connectivity, within the next few years the gap between them would reduce to zero. There is also the prospect that rural electricity access may converge the urban access level soon, however, the pace of urbanization may delay this process. While access to electricity enjoys a long-term increasing trend, the disparity between urban and rural access (assuming urban access > rural access) to electricity is decreasing over this period (Figure 4).

4 Employment Pattern

Overall, employment during the period under study has shown a sectoral shift from agricultural employment to service- and industry-focused employment

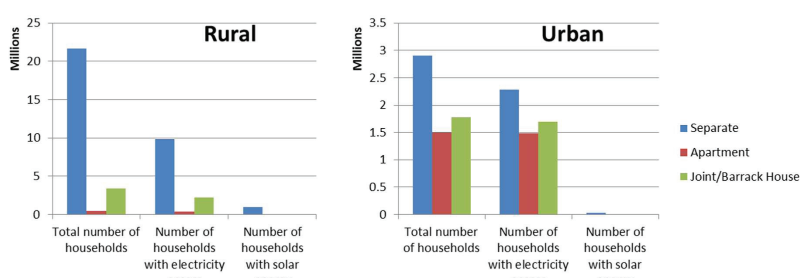

Figure 2 Dwelling household by type and source of lighting, 2011 (Source: BBS, 2015).

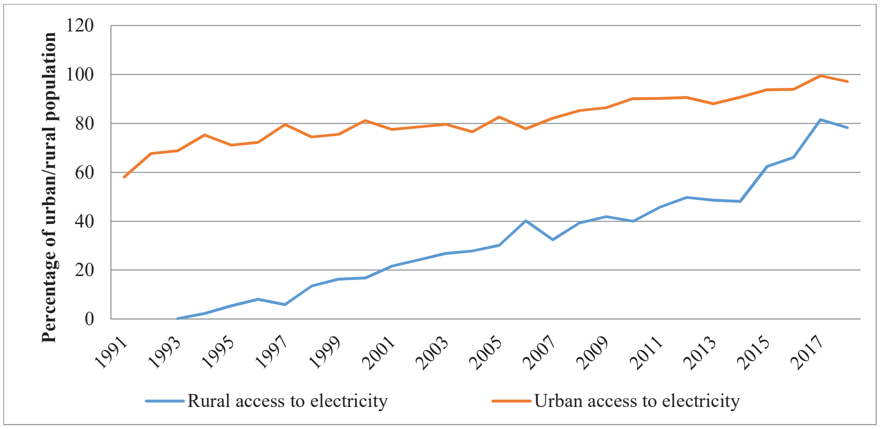

Figure 3 Access to electricity during 1991–2018 in Bangladesh (Source: World Bank Database).

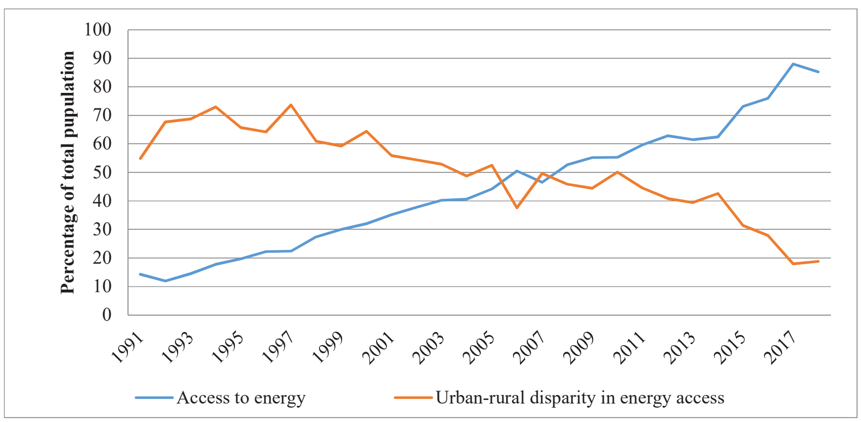

Figure 4 Trend in overall access to electricity and urban-rural disparity in energy access (Source: World Bank Database).

(see Figure 5). A more than 40% decrease has occurred in the agriculture sector, while employment in both service and industry almost doubled during the same period.

A gender-based perspective towards employment by sector, however, suggests a somewhat different scenario (Figures 6 and 7). According to the latest labour force survey from 2016, total labour force participants of 15+ years of age was 109.1 million in Bangladesh, comprising 54.1 million males and 55.0 million females. The total labour force registered in rural areas

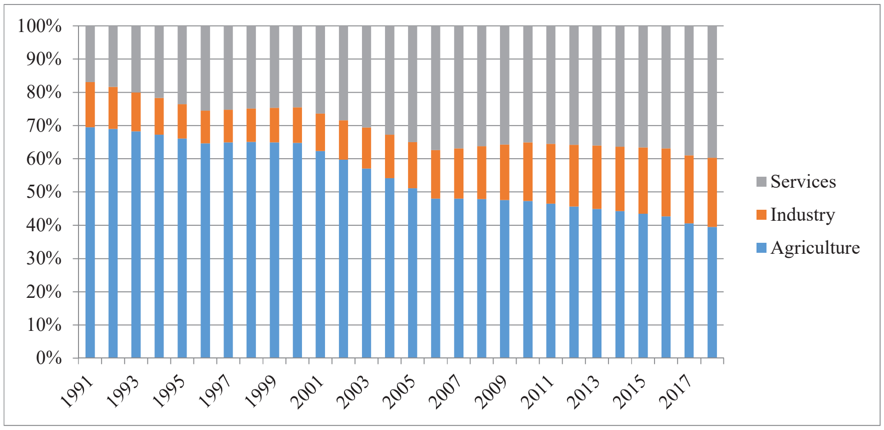

Figure 5 Proportion of total employment by sector (Source: adapted from World Bank Database).

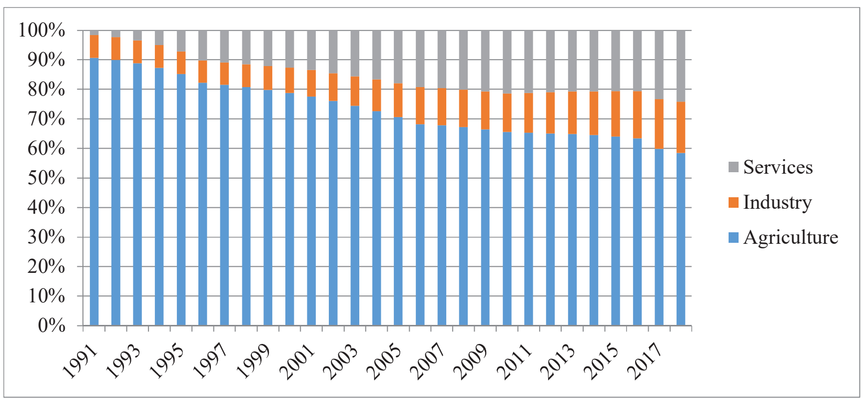

Figure 6 Proportion of female employment by sector (Source: World Bank Database).

was 77.1 million, including 38.3 million males and 38.8 million females. The urban counterpart had below half in all categories compared to that of the rural labour force (BBS, 2018a).

Agriculture was dominant for female employment by sector. More than 90% of the economically active female population was employed in agriculture in 1991, reducing by one third by 2018. However, a 1.5-fold increase was observed in female employment for industrial production, while a 15-fold increase occurred in the services sector. Male employment followed a similar trend. Over 60% of the (economically active) male population was employed

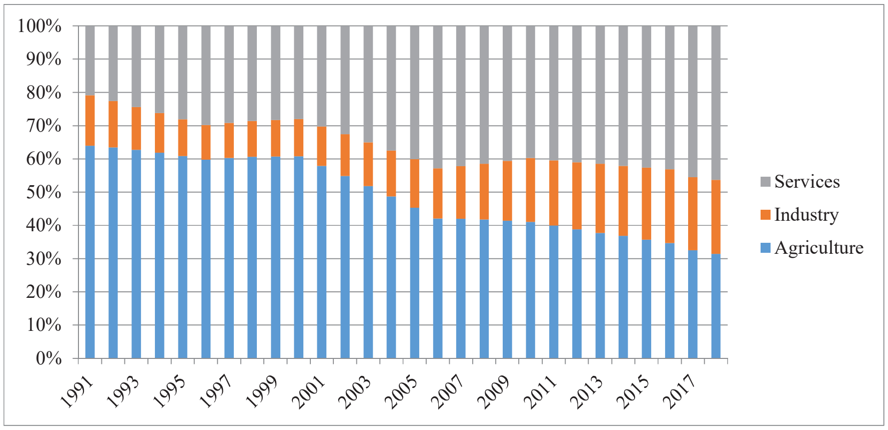

Figure 7 Proportion of male employment by sector (Source: World Bank Database).

in agriculture in 1991, nearly halving to 31% in 2018. The male industrial workforce increased from 15% in 1991 to 22% in 2018, an increase of 48%, whilst service workforce was reported as 21% in 1991 and rose to 46% in 2018, more than doubled during the same time.

5 Electricity-employment Nexus

In many least developed and emerging market countries relatively small numbers of citizens have been connected via off-grid; many efforts have been viewed as piecemeal and stopgap, and the possibilities for scaling up and including greater numbers of low-income consumers are yet to be seen (cf. Bouzarovski et al., 2017; Degani et al., 2020). Yet, in Bangladesh, home to the largest off-grid solar power program in the world, the solar home system (SHS) program is considered to have been critically important in achieving the 'electricity for all' vision of the country (Cabraal et al., 2021).

Focusing on Brazil, Perez-Sebastian et al. (2020) have found that increased electricity access favours industrial manufacturing productivity and removal of entry barriers to investment, followed by support to services and agricultural activities. The authors focused on structural transformation or the relocation of inputs from agriculture to industry and service, and later from agriculture and industry to service. However, the focus was not on employment creation per se. Bryan et al. (2017) have found that solar PV technologies may have greater effects on employment generation in the UK. In sub-Saharan African context as well, evidence suggests that shortages

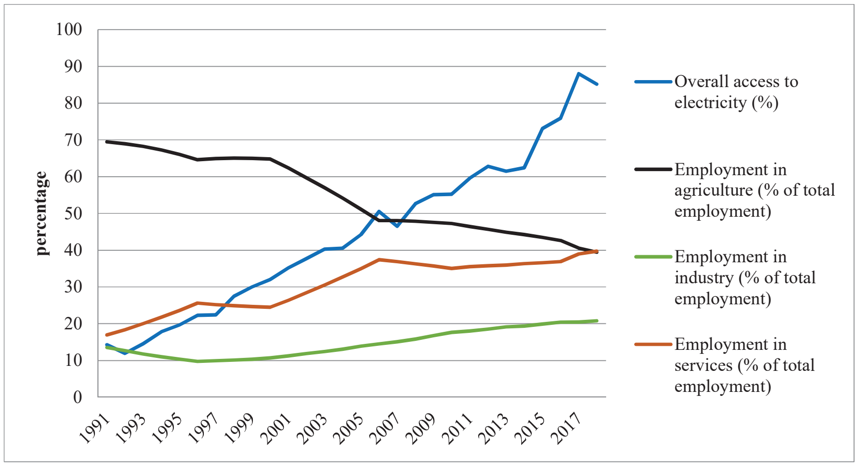

Figure 8 Overall access to electricity and employment in various sectors during 1991 to 2018 (Source: World Bank Database).

of electricity result in low employment through restricting new business creation, reducing output and productivity, while reducing trade and export competitiveness (Mensah, 2018). If domestic energy production is assumed to enhance accessibility, employment was found to correlate with energy production in Turkey (Awad and Yossof, 2016). Increased electricity access and associated improvements to electricity services and infrastructures have positively influenced employment opportunities within the supply side of labour markets in Mozambique (Cotton et al., 2019). Kim and Jeong (2016) have found that overall employment, excluding in agriculture, increases with electricity restructuring programs, which include, among other things, reducing prices through raising operational efficiency. The authors also argue that high-emissions industries experience higher employment in the US (Kim and Jeong, 2016).

Overall, jobs in the agriculture sector dropped dramatically in Bangladesh from 70% to 40% in the period from 1991 to 2018, while in parallel, electricity access has increased from 14% to 85% during this same period (see Figure 8). Employment in industry and services was steadily increasing over this period, with a slight decrease in the service sector during 1991–1997, given growth in the share of manufacturing in the GDP over the last three decades (as observed in Section 2).

Employment in agriculture sector reduces with increases in overall electricity access. The greater access to electricity Bangladesh achieves, agricultural activities appear to diminish, and this might result from a range of factors including unavailability of suitable agricultural land, shifting land ownership patterns, growing mobility of populations, growing contact with communications via electricity access luring rural residents to the "bright lights" of urban areas, along with the higher income potential from other sectors. However, an important corollary to these finding is that if agricultural productivity decreases due to lower employment in agriculture, national food security may be challenged, which might result in higher import of food commodities and rising food prices. This may also be concluded that with higher level of energy access, employment opportunities increase in other sectors, resulting low employment in agriculture, which being traditionally labour intensive is harder to perform. Industrial activities go up as a result of higher electricity access, and which would require more people for industrial units. This shift in employment seems beneficial for the nation; however, such transition should not be promoted at the cost of agriculture. The global service sector has experienced growth, and the increase in electricity access may have an influence in such unprecedented growth. Expansion in the sector would also require a larger workforce.

In research on dynamics surrounding electricity access, another concern is with urban-rural disparities with respect to employment. In contrast to what might be intuitively expected, researchers have found that access to electricity overall and in urban areas positively influences agricultural productivity in Sub-Saharan Africa while rural electrification has had a minimal impact. This suggests that rural electrification efforts may not be a sufficient condition for promoting agricultural productivity, at least in the case of Sub-Saharan Africa (Omoju et al., 2020). In a further study, electricity access in Rwanda did not have a significant impact on income generation, proving a possible explanation of why employment might have not been affected (Lenz et al., 2017). The energy access and socio-economic development nexus is complex, and has temporal and geographical specificities (Riva et al. 2018). Bayer et al. (2020) suggest revisiting the concrete developmental effects of the electrification process through impact evaluation methods.

6 Discussion

The agricultural sector, which consists of crops, livestock, fisheries and forests, and spans much of the country, has been providing employment to around 40% of the Bangladesh labour force in recent years. While it substantially contributes to GDP, employment in the sector has reduced steadily since 1991. As agricultural production occurs predominantly in rural areas, the decline indicates lower production due to a decline in available cultivable land or mobility towards opportunities in the urban (or minor rural) industrial sector, or a combination of both. However, the national crop statistics indicate that different categories of rice show different production trends. For instance, areas in which *aus* and *boro* variety of rice are cultivated, and the respective production reduced through 2016–17 for two consecutive years, while both indicators for *aman* rice increased. Overall production of rice and wheat, along with other major cereals, for instance pulses, edible oil seeds, spices and condiments, reduced during this period, while minor cereals, potato, and jute production increased (BBS, 2018b). A downturn in job opportunities in this sector may obstruct the expansion of agro-industrial development in the country. There is an argument that farmers are not paid according to their efforts in production while the middlemen, with some positive roles, enjoy the most benefits by (un)intentionally interrupting the supply chain (Dakshayini and Prabhu, 2019; Singha and Maezawa, 2019). If energy access coupled with the mentioned issues restricts or results in reduced job opportunities in the agricultural sector, national energy policy should address innovative tools to address such limitations.

The increases of overall jobs in industry and services, along with male and female categories, appear to be positive, strengthening the national economy. The jobs in agriculture are negatively associated with electricity access. Urban electricity access is of less importance, since urban areas host negligible agricultural activities. Since volume of agricultural land is limited and has been reducing constantly, there is less scope to generate additional employment. Hence, industrialization is the window. However, a substantial decline in agriculture is alarming for two possible reasons. First, there might be a sharp decrease in agricultural land due to urbanization and industrialization. Second, motivation for agricultural activities may be fading. If increased energy access results in industrialization by grabbing more and more agricultural land, national energy policy must address the issue for the greater benefit of the population. If motivation towards agricultural activities is declining due to alluring industrial jobs, incentives must be ensured for farmers. However, this issue is beyond the scope of this paper.

This analysis has several important implications for policymakers. First, public officials should consider taking strong action to increase jobs in the agriculture sector, since historically agriculture is the driving element of national economy. New job opportunities may range from seed preparation to preservation to distribution. Counter intuitively, mechanized production may also increase some employment opportunities, including for repair and maintenance of equipment. Changing climate, meanwhile, potentially will impede agricultural productivity nationwide. A dedicated effort must be given to adaptation to climate change, since mitigation efforts are costly for developing countries, through climate-smart technologies, changing harvesting time and saline-tolerant variety for instance. Waterlogging and drought conditions also affect agriculture, hence new job opportunities need to be created to address these conditions. Agriculture in flood prone areas requires massive use of floating harvesting, where employment may be generated. Since renewable energy sector has the potential to raise employment substantially (IRENA, 2021), agriculture sector may take the opportunity.

Second, policymakers in Bangladesh should prioritize extending uninterrupted electricity access in rural communities and regions in particular. This analysis suggests that electricity connectivity is more stable in urban as compared to rural areas, where it is needed in powering and enabling agricultural activities, and related pursuits such as agro-processing and inputs. However, this diverges from the findings from Omoju et al.'s (2020) recent research on sub-Saharan Africa, which has argued that electricity access in rural areas does not affect agricultural productivity; instead, electrification in urban area significantly positive impacts agricultural productivity. For a 1% increase in urban electricity access, agricultural productivity rises by 0.62%, which is statistically significant, while for rural access to electricity the change is only 0.19% and insignificant. Rural access to sources of energy micro-generation and 'islanded' systems, such as SHS and solar PV mini-grid systems, is not sufficient to support wider agricultural activities, although solar-powered irrigation systems and water pumps are in practice, yet at a scale that remains insufficient to meet the demand. Accordingly, central and local governments in Bangladesh should take necessary measures for ensuring access to electricity within agricultural production and distribution activities, which entails the scaling up of off-grid systems and potentially linking them to the centralized electricity grid, rather than merely supporting energy for lighting, heating water, and mobile phone charging within households and rural village economies.

And third, apart from expanding electricity access, the GoB must also attend to the need for clean fuel access among both rural and urban populations. This measure will be helpful in climate change mitigation strategies, while also enabling further rural socio-economic opportunities.

7 Conclusion

This review has emphasized that, while urban and rural development trajectories have historically diverged, including for electricity connectivity rates, energy access in Bangladesh has been growing substantially during the last thirty years (1990–2018). Rural access has increased at a steeper pace compared to that enjoyed by urban areas. These patterns have led to a decline in the urban-rural disparity in energy access. The use of renewable energy in urban areas is much lower than that in the rural areas due to widespread installation of SHS targeting rural households and small businesses by government agencies and international donors.

In this period, overall employment has shown a sectoral shift from agricultural employment to service-oriented and industrial employment. Around 70% of the labour force is employed in rural areas, with an equal share of male and female. The proportion of the feminine labour force involved in agriculture has declined by one third during this period, while that in industrial employment has increased. Furthermore, female employment in services sector has risen ten-fold above the increase in industrial employment for women. Although not as marked as the trend as female employment, male employment has also experienced a similar pattern.

We have sought to demonstrate the relationship between state-led electrification efforts and workforce employment trends and pathways. Based on the analysis undertaken here, drawing on the critical social sciences literature on the multiple links between energy access, socio-economic development and human wellbeing, we have found that as greater access to electricity achieved in the country in the past 30 years, the levels of employment in agriculture decreases.

The long-term reduction in agricultural employment stems from the intersection of a range of factors including the increasing scarcity of suitable agricultural land, historical land ownership patterns, growing mobility of populations, increasingly including female workers, higher income potential from other sectors, and possibly the early effects of a changing climate on both human mobility and access to arable land. In terms of policy implications, this study suggests that should agricultural productivity decrease due to lower levels of employment in agriculture, national food security may be negatively affected, which might result in higher food item import and potentially rising food prices in the marketplace. The GoB must plan accordingly and implement measures to incentivize domestic food provision.

Annexure 1 Economic Zones in Bangladesh

Sl.	Name	Upazila	District	Land Area (Acres)
Government-owned sites				
1	Mongla EZ	Mongla	Bagerhat	205
2	Mongla EZ*	Mongla,	Bagerhat	110.15
3	Rampal EZ	Rampal	Bagerhat	300
4	Sundarban Tourism Park	Shoronkhola	Bagerhat	1546.35
5	Agailjhara EZ	Agailjhara	Barisal	300
6	Bhola sadar EZ	Bhola Sadar	Bhola	304.07
7	Bogra EZ-1	Ushajahanpur	Bogra	251.43
8	Ashugonj EZ	Ashugonj	Brahmanbaria	328.61
9	Anawra-2 (CEIZ)	Anawra	Chittagong	774.48
10	Anwara EZ	Gahira, Anwara	Chittagong	503.7
11	Mirsarai EZ	Mirsarai	Chittagong	13117.782
12	Patiya EZ	Patiya	Chittagong	774.48
13	Comilla EZ	Meghna	Comilla	272
14	Cox's Bazar Special EZ	Moheshkhali	Cox's Bazar	8784.77
15	Jaliardip Economic Zone EZ	Taknaf	Cox's Bazar	271.93
16	Moheshkhali-1 EZ	Moheshkhali	Cox's Bazar	1438.52
17	Moheshkhali-2 EZ	Moheshkhali	Cox's Bazar	827.31
18	Moheshkhali-3 EZ	Dholghata	Cox's Bazar	1501.04
19	Moheshkhali Special Economic Zone	Ghotibagha	Cox's Bazar	1000
20	Moheshkhali Special Economic Zone Cox's Bazar	Ghotibagha and Sonadiya, Moheshkhali	Cox's Bazar	12962.22
21	Moheshkhali Special Economic Zone Kalamarchora	Moheshkhali	Cox's Bazar	3980.07
22	Sabrang, Tourism SEZ	Tacknaf	Cox's Bazar	1027.56
23	Dhaka EZ	Dhohar	Dhaka	316.35
24	Dhaka SEZ	Karanigonj	Dhaka	105
25	Feni Economic Zone	Sonagazi	Feni	7219.79
26	Shreepur EZ	(Nayanpur), Shreepur	Gazipur	510
27	Sreepur EZ	Sreepur	Gazipur	510
28	Gopalganj EZ	Kotalipara	Gopalganj	201.83
29	Gopalganj EZ-2	Gopalganj Sadar	Gopalganj	200
30	Habigonj EZ	Chunurughat	Habigong	511.83

(*Continued*)

Annexure 1 Continued

Sl.	Name	Upazila	District	Land Area (Acres)
31	Jamalpur EZ-2	Jamalpur Sadar	Jamalpur	263.25
32	Jamalpur EZ	Jamalpur sadar	Jamalpur	457.77
33	Khulna EZ-1	Boiyaghata	Khulna	519.52
34	Khulna EZ-2	Terkhada	Khulna	509.64
35	Kustia EZ	Bheramara	Kustia	506.77
36	Manikgnnj EZ	(BIWTA old Aricha Ferighat), Shibaloy	Manikganj	300
37	Shrihatta EZ	Sherpur	Moulavibazar	352.12
38	Munshiganj Gazaria EZ	Gazaria	Munshiganj	97.98
39	Mymensingh EZ	Mymensingh	Mymensingh	487.77
40	Mymensingh EZ	Mymensingh Sadar	Mymensingh	494
41	Araihazar-2 Economic Zone	Araihazar	Narayanganj	400
42	Araihazar Economic Zone	Araihazar	Narayanganj	1010.9
43	Narayanganj EZ	Bandar & Sonarga	Narayanganj	875.65
44	Narsingdi EZ	Narsingdi Sadar	Narsingdi	690.2016
45	Nator Economic Zone	Lalpur	Nator	3220
46	Netrokona EZ-1	Netrokona Sadar	Netrokona	266.755
47	Nilphamarai EZ	Nilphamari Sadar	Nilphamari	357.76
48	Panchghar EZ	Debiganj	Panchghar	595.01
49	Rajshahi Economic Zone	Paba	Rajshahi	204.06
50	Rajshai EZ	Poba	Rajshai	204.6
51	Shariatpur Economic Zone	Jajira	Shariatpur	525.265
52	Shariatpur Economic Zone	Gosharhat	Shariatpur	750
53	Sherpur Economic Zone	Sherpur	Sherpur	361.08
54	Narayanganj EZ Sonargaon	Sonargaon	Sonargaon	1000
55	Sylhet Special EZ, Gowainghat	Gowainghat	Sylhet	255.83
Private sites				
1	A K Khan PEZ	Polash	Narshindi	200
2	Megna Industrial Economic Zone PEZ	Sonargaon	Narayangonj	80
3	Megna Economic Zone PEZ	Sonargaon	Narayangonj	68

(*Continued*)

Annexure 1 Continued

Sl.	Name	Upazila	District	Land Area (Acres)
4	Aman Private EZ	Sonargaon	Narayangonj	150
5	Abdul Monem PEZ,	Gojaria	Munsigonj	197
6	Bay Private EZ	Gazipur	Gazipur	65
7	United City IT Park Ltd.	Badda and Vatara	Dhaka	2.43
8	Arisha Private EZ	Keranigonj, Savar	Dhaka	84.95
9	East-West Special EZ	Keranigonj	Dahaka	54
10	Bosundhora Special EZ	Keranigonj	Dahaka	56
11	Sirajganj EZ	(Adjacent to Bangabandhu Bridge), Sirajganj Sadar & Belkuchi	Sirajganj	1041.43

Source: BEZA, 2020
*For Indian Investors (G2G)
** Agro Food Processing Zone.

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