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# A Just Jobs Index for India

## How do Indian States Fare in the Creation of Good Jobs?

June 2019
By Sabina Dewan and Divya Prakash

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# Executive Summary

Indians have expressed optimism that the nation will deliver better livelihoods for more people, an economy of productive jobs with commensurate wages, economic mobility, and the opportunity to realize their aspirations. This dream requires a strong labor market to become a reality. Yet, despite economic growth, the pace of job creation has been slow. India faces rising unemployment, especially for youth; low labor force participation made worse by steadily declining female participation; and most workers continue to be employed in the informal sector.

The need for urgent action in creating a more job-rich Indian economy that harnesses the productive potential of its population and raises living standards for more of its people could not be clearer. These pressing goals require data that accurately reflects the state of the labour market and help the public and policymakers regularly gauge whether progress is being made.

To further this critical policy imperative, the JustJobs Network has developed a State-Just Jobs Index – a comprehensive, data-driven tool to measure the quantity and quality of jobs – at the State level in India. This Index, the first of its kind, broadens the discourse on employment beyond incomplete metrics of unemployment to delve into the factors driving the rankings.

The goals of the Index are three-fold: to deliver a regular and reliable source of information on the state of employment in India, highlight differences across states, and to serve as a tool to support polices for job creation—especially in lagging states.

## How is the State JustJobs Index constructed?

The Index covers five dimensions—employment, formality, benefits, income equality, and gender equality. Each dimension is based on a set of equally weighted indicators. The Index draws exclusively from government sources, including surveys conducted by the National Sample Survey Organisation, the Labour Bureau, the Annual Survey of Industries, the Reserve Bank of India, and the recently released Periodic Labour Force Survey. For each indicator, the Index uses a mean of the available values between 2010-2018.

## How do states compare on the State JustJobs Index?

Most of the country has seen increasing economic growth, yet state performance on the Index varies significantly. Best performers economically are not necessarily best performers on jobs, and vice versa. A combined Overall score with equal weights across the five dimensions place Andhra Pradesh at the top of the Index, and Uttar Pradesh at the bottom (see Table).

One of the special features of this exercise is that users of the State Just Jobs Index will be able to customise the Index with their own weights, on a dedicated website, which will provide access to

## State Just Jobs Indices

| Rank | State/ Union Territories | Index (Uniform weight | Index (Employment-biased | Rank |
|------|--------------------------|------------------------|---------------------------|------|
| 1 | Andhra Pradesh | 57.4 | 80.6 | 2 |
| 2 | Maharashtra | 57.2 | 71.7 | 4 |
| 3 | Chhattisgarh | 56.4 | 85.6 | 1 |
| 4 | Tamil Nadu | 52.7 | 46.3 | 15 |
| 5 | Karnataka | 52.7 | 64.9 | 8 |
| 6 | Delhi | 52.6 | 53.2 | 12 |
| 7 | Uttarakhand | 52.6 | 65.2 | 7 |
| 8 | Himachal Pradesh | 52.1 | 74.3 | 3 |
| 9 | Jharkhand | 44.4 | 60.4 | 10 |
| 10 | West Bengal | 44.3 | 38.9 | 19 |
| 11 | Jammu & Kashmir | 43.9 | 22.9 | 21 |
| 12 | Haryana | 43.6 | 54.7 | 11 |
| 13 | Goa | 42.6 | 49.3 | 14 |
| 14 | Punjab | 42.1 | 41.3 | 17 |
| 15 | Rajasthan | 42.1 | 62.1 | 9 |
| 16 | Kerala | 41.6 | 68.8 | 5 |
| 17 | Madhya Pradesh | 41.6 | 23.6 | 20 |
| 18 | Gujarat | 40.3 | 67 | 6 |
| 19 | Odisha | 37.7 | 52.8 | 13 |
| 20 | Bihar | 37.3 | 39.1 | 18 |
| 21 | Uttar Pradesh | 32 | 46.8 | 16 |

**Source:** JustJobs Network.
**Note**: Scores are based on available data from 2010-2018. Scores for seven North-Eastern states were excluded due to small sample sizes in the available data.

the underlying data and transparency about the method of calculation.

To illustrate this, a different set of weights were used to construct an alternative combined Index.

In this illustration, 80 percent of the weight is attributed to the employment dimension and the remaining dimensions are given weights of five percentage points each. This result is also reported in the Table below, to show how

the state rankings may change with a change in weights. Similar exercises can be carried out for other dimensions, for example, for a gender equality biased Index.

Scores by dimension show the following:

**Employment:** Owing to a high labour force participation rate, the top performer on this dimension is Chhattisgarh. Due to high unemployment, including high youth unemployment, Goa has the lowest score.

**Formality:** Employment in India is a continuum from formal to informal, from workers who have a contract with regular wages and social protections, to daily wage workers with no written contracts. Some types of informal employment are associated with vulnerability, lacking decent working conditions. Formal and informal workers exist across the public and private sector in registered and unregistered enterprises. Goa scored at the top in reducing informal employment, while Uttar Pradesh scored at the bottom.

**Benefits:** Access to social protection and collective bargaining can help workers realize their potential and improve productivity. Due to relatively high state expenditures on pensions and union participation, Jammu and Kashmir scored at the top. Gujarat scored at the bottom, due in part to low union participation.

**Income equality:** Though longer periods of economic growth are associated with greater quality of income distribution, income inequality remains high in India. Chhattisgarh scored at the top (meaning lower inequality), while Kerala was at the bottom, due in part to high inequality of consumption.

**Gender equality:** While female labour force participation remains low in India, harnessing women's potential would strengthen the country's economy and its social fabric. Himachal Pradesh scored at the top of this dimension, while Bihar scored at the bottom. Findings across States suggest that States that performed better on the gender equality dimension are associated with a better overall score on the Index.

## Where Do We Go from Here? An Action Agenda on Jobs

At the central level, the nation needs a National Employment Strategy to generate productive and well-remunerated jobs, and to allocate resources toward sectors that absorb more labour. Budget priorities should include long-term investments in human capital, such as good quality education, skills and on-the-job training. The nation also needs strong labour market institutions—including thoughtful labour reforms, the implementation of a statutory minimum wage, and provision of social protection.

Job creation strategies must be rooted in the assets and needs of smaller administrative units. The State-Level Just Jobs Index is a step in this direction. The Index is a tool that can underpin a National Employment Strategy and help States chart a path toward shared prosperity for the nation.

# 1. Introduction

As the dust settles after a hard fought but easy won election, the voter stands holding on to her fragile optimism that this time things will be better. Underpinning this optimism is the expectation that the government will deliver better livelihoods for more people; and an economy rich in productive jobs with commensurate wages, economic mobility, and the opportunity to realize the aspirations that drive and motivate workers daily.

An ailing labor market, though, impedes this hope from becoming a reality. Despite economic growth, the pace of job creation has been slow. The nation confronts rising unemployment, especially for youth; and low labor force participation[i] made worse by a steadily declining female participation rate. In addition, a stubbornly high (though slowly declining) share of non-agricultural workers remain in the informal sector.[1]

These facts call into question the pervasive notion that if we generate economic growth, the jobs will come. Several estimates suggest that this is not the case anymore. Economic growth generates fewer jobs than it did in the past.[2] Long-run employment elasticity of growth declined from 0.59 between1972/73-1993/94, to 0.26 between 1994-2002, and fell to 0.07 between 2003-11.[3] Though the decline in the number of jobs that economic growth generates mirrors a global trend, against the backdrop of India's large and growing population, it is particularly worrying.

Moreover, when it comes to India's labor market, the need to generate millions of new jobs isn't the only challenge. Equally pressing is the need to improve the quality of work of those who are trapped in low-productivity jobs with poor wages, and often in poor, and sometimes exploitative, working conditions.

Yet progress on addressing the nation's jobs crisis is mired in a raging debate over the scale of job creation, the availability of data, and which sources and indicators – unemployment or productivity and wages - accurately reflect the state of the job market. The need for urgent action in creating a more job-rich Indian economy that harnesses the productive potential of its population and raises living standards for more of its people could not be more clear.

To further this critical policy imperative, the JustJobs Network has developed an index – a comprehensive, data-driven tool to measure the quantity and quality of jobs – at the State level in India. The State-JustJobs Index (S-JJI), the first of its kind to measure both quantity and quality of jobs, broadens the discourse on employment beyond the incomplete metric of unemployment, to delve into the factors driving the rankings.

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[i] Defining labor force participation rate (LFPR) as the total number of employed and unemployed persons in the country out of the total population above 15 years of age. Among persons of age 15 years and above, LFPR in usual principal and subsidiary status was 49.8 percent; 50.7 per cent for rural areas and 47.6 per cent for urban areas.

Indices are the subject of criticism. Perhaps rightly so. They aggregate data in a way that can conceal important information. Different weighting of indicators could reflect subjective priorities that can be questioned. Yet, from the Ease of Living Index[4] and the Human Development Index[5] to the Ease of Doing Business[6] rankings, indices abound because they serve a purpose. They take several complex issues and collapse them into a single number that not only allows one to gauge relative performance, but more importantly, this single number becomes a powerful vehicle for discourse to drive policy change. These are among the virtues of estimates such as the Gross Domestic Product (GDP).

The objectives of the S-JJI for India are as follows:

1. To serve as a regular and reliable source of information on the state of employment in India, underscoring the challenges the working age population faces in finding gainful employment, securing economic mobility and harnessing its productive potential.

2. To highlight differences across states and uncover important place- and policy- specific characteristics that may account for the differences in performance on employment.

3. To serve as a tool to support polices for more and better job creation, especially in lagging states.

Once an index is constructed, rankings are a gateway to delve deeper into the factors that drive the ranking. In the case of the JustJobs Index, this report provides State-by-State[ii] scores for each indicator, but policy makers can take this further to assess which factors drive the trend and which interventions would improve performance on the indicators toward a higher score for the State. Beyond policymakers, a score that captures the relative health of the labor market in a State also provides important information for businesses looking to establish or expand operations, or to find markets for their products and services. A tool that systematically measures the pulse of the nation's job market will, over time, provide insight into how labor markets are adjusting to disruptions such as technology, urbanization and climate change. It can also provide perspectives on other trends such as migration.

The lack of reliable real time data on jobs in India is well recognized.[iii] In the construction of the State-level Just Jobs Index, the authors have drawn exclusively from a range of government sources including surveys conducted by the National Sample Survey Organisation (NSSO), the Labor Bureau (LBGoI), the Annual Survey of Industries

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[ii] The State JustJobs Index covers 20 Indian States and one union territory (UTs) -- Delhi. Telangana was formed in June 2014.For all the data available for Telangana and Andhra Pradesh (AP), in absolute terms after 2014, the data has been collectively included in a single segment for analysis under Andhra Pradesh. All data for Andhra Pradesh post 2014, after AP and Telangana split, were dropped. The seven North-Eastern States, namely: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Sikkim have been excluded in the final analysis because of their small sample sizes in the NSS and Labor Bureau surveys. A concerted effort to collect data in this part of the country is urgently needed.

[iii] *"The lack of reliable estimates on employment in recent years has impeded its measurement and thereby the Government faces challenges in adopting appropriate policy interventions,"* wrote the government's Chief Economic Advisor Arvind Subramanian in the 2016-2017 Economic Survey. The Survey goes on to acknowledge the many limitations of India's labor market data including, *"partial coverage, inadequate sample size, low frequency, long time lags, double counting, conceptual differences and definitional issues."*

(ASI), the Reserve Bank of India (RBI) as well as the recently released Periodic Labor Force Survey (PLFS).[7] As more waves are fielded and time series data becomes available, the State-level Just Jobs Index will become an increasingly powerful tool to drive improvement in the quantity and quality of jobs. States would not only be able to measure their own performance over time, but also compare how they fared relative to other States.

At the moment, politicians, policymakers, practitioners and the private sector place a disproportionate emphasis on metrics such as GDP or on indices that measure competitiveness and the *Ease of Doing Business*, as proxies for economic opportunity. Perhaps they look to these imperfect measures alone because they lack a tool for analysing performance on the economic indicator that matters most to ordinary people: jobs.

Following the introduction, section two provides an overview of the methodology for constructing the State-level Just Jobs Index. Section three of this report provides some context into the economic backdrop of Indian States honing in on the Net State Value Added (NSVA) growth rates. In part four, the report explains each of the dimensions comprising the Index. It describes how states perform on each of these dimensions and notes the highest performers on the dimension and those that need improvement. Section five reveals the rankings of Indian States on the S-JJI. Section six highlights the main conclusions that emerge from this exercise.

# 2. Methodology

India is a complex nation; its complexity is reflected in its labor market. The nation's large and growing youth cohort offers a demographic advantage in which the working age population constitutes a rising share in the total population with a relatively smaller dependent population, but the large population also exerts enormous strain on the economy to deliver gainful employment to so many people. Those that are unable to find work in the formal sector end up eking out a living in the informal sector, with limited or no social protections. Social divisions on the basis of caste, gender and religion impact access to opportunity that manifest in disparities in employment and wage outcomes.

Against this backdrop, the S-JJI hones in on five dimensions to capture some of the heterogeneity of the Indian labor market. These are (i) employment, (ii) formality, (iii) benefits, (iv) income equality and (v) gender equality. **Table 1** presents these five dimensions and the associated indicators used to measure the dimension. Appendix 1 explains each indicator in detail.

Within these dimensions there are some indicators where higher values indicate better conditions. For example, the labor force participation rate (LFPR), share of workers with a written job contract excluding the self-employed, share of regular wage workers in total employment, share of workers with a union association excluding the self-employed, share of workers with provident fund/pension coverage excluding the self-employed, State expenditure on pensions as percentage of Gross State Domestic Product (GSDP) and the ratio of minimum wages to average wages are indicators for which higher values are better. When it comes to unemployment rates, youth unemployment rates, share of own-account and contributing family workers in total employment, Gini coefficient of consumption inequality and ratio of informal to formal wages, lower values are more desirable. For a third set of indicators, namely, the ratio of female to male LFPR, female to male employment rates and female to male real average wages, equal values are better.

In construction of this index, the authors separated the supply-side quality dimensions – those pertaining to the worker such as education or skill, which have a bearing on the worker's experience of the job, from the demand-side dimensions of the job itself. Since the index is focussed on the quantity and quality of jobs, the authors chose to focus on the demand-side.

Taken together, the dimensions of the S-JJI reflect relative State performance on working conditions, quality and quantity of jobs, level of income and gender equality. Each dimension consists of three different indicators. In order to weigh all dimensions and indicators equally, there are the same number of indicators in each dimension.

Dealing with outliers and missing values are common challenges when constructing an index.

Table 1

## State-Level Just Jobs Index: Dimensions and Indicators

| Dimensions | Indicators |
| --- | --- |
| Employment | Labor force participation rate, ages 15+ (high is better) |
| | Unemployment rate, ages 15+ (low is better) |
| | Youth unemployment rate, ages 15-29 (low is better) |
| Formality | Share of own-account and contributing family workers in total employment (low is better) |
| | Share of workers with a written job contract, excluding the self-employed (high is better) |
| | Share of regular workers in total employment (high is better) |
| Benefits | Share of workers with a union association, excluding the self-employed (high is better) |
| | State expenditure on pensions as percentage of Gross State Domestic Product (GSDP) (high is better) |
| | Share of workers with Provident Fund (PF)/pension, excluding the self-employed (high is better) |
| Income equality | Ratio of minimum wages to average wages (high is better) |
| | Gini coefficient of consumption inequality (low is better) |
| | Ratio of informal wages to formal wages (high is better) |
| Gender equality | Ratio of female to male employment rates (equal is better) |
| | Ratio of female to male labor force participation rate (equal is better) |
| | Ratio of female to male real average wages (equal is better) |

There are several ways to address these concerns. Using the mean or median over a period of time is the most commonly used, and arguably the best, of methods. For each indicator, this report uses a mean of the available values between 2010-2018. For instance, if only two values are present for a given indicator during this period, the authors take the average of the two; if there are five, the authors take the average of the five.

The mean values for each indicator have then been linearly transformed into a normalised value using different methods detailed in *Annexure 1*. Based on the results of the sensitivity analysis, all of the Index calculations presented in the report are based on the Min-Max Rescale method.

# 3. The Economic Context

According to the International Monetary Fund, India is the fourth largest economy in terms of GDP at purchasing power parity, and the seventh largest economy in nominal terms.[8] Even though GDP growth rates have risen, the relationship between GDP growth rates and employment generation has grown weaker over time. In this section, the authors use Net State Value-Added to examine the performance of each State for the period between 2012-13 and 2016-17.

Between 2012-13 and 2016-17, on average Andhra Pradesh, Delhi, Gujarat, Jharkhand, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Uttarakhand saw NSVA growth rate greater than all other States. On average, Gujarat maintained consistently high NSVA growth rates of near 10 percent or higher during this period. Andhra Pradesh and a few other States have also seen growth rates of over 10 percent at specific points in time. Yet, despite NSVA growth, State performance on the different dimensions of the Index varies significantly. Best performers on NSVA are not necessarily best performers on the Index, and vice versa.

Table 2

## Net State Value Added (NSVA) Growth rates at Constant Prices (Base 2011-12)

| State/ UT's | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 |
|---|---|---|---|---|---|
| Andhra Pradesh | 0.44 | 5.45 | 9.37 | 9.73 | 10.35 |
| Bihar | 3.87 | 2.69 | 3.26 | 4.99 | 10.52 |
| Chhattisgarh | 4.32 | 10.93 | 0.89 | 4.77 | 8.95 |
| Delhi | 5.26 | 5.8 | 9.93 | 8.73 | 7.34 |
| Goa | -16.04 | -16.44 | 33.14 | 14.13 | 12.55 |
| Gujarat | 11.06 | 7.23 | 9.67 | 9.83 | 10.36 |
| Haryana | 5.97 | 7.91 | 4.86 | 8.34 | 8.6 |
| Himachal Pradesh | 7.06 | 7.48 | 7.22 | 7.96 | 6.65 |
| Jammu & Kashmir | -0.37 | 4.11 | -5.4 | 19.74 | 5.81 |
| Jharkhand | 8.75 | -0.05 | 13.75 | -9.14 | 9.8 |
| Karnataka | 5.48 | 9.24 | 5.08 | 11.08 | 6.6 |
| Kerala | 5.67 | 5.14 | 4.34 | 4.57 | 6.06 |
| Madhya Pradesh | 8.45 | 3.21 | 5.33 | 6.94 | 12.17 |
| Maharashtra | 5.5 | 6.43 | 6.05 | 6.92 | 9.83 |
| Odisha | 5.89 | 7.29 | 0.6 | 7.6 | 10.31 |
| Punjab | 4.43 | 4.62 | 3.69 | 5.3 | 6.1 |
| Rajasthan | 3.25 | 5.15 | 6.8 | 5.53 | 6.35 |
| Tamil Nadu | 4.31 | 5.06 | 5.61 | 8.55 | 3.61 |
| Uttar Pradesh | 4.76 | 4.44 | 2.5 | 8.6 | 6.79 |
| Uttarakhand | 7.33 | 7.08 | 6.9 | 7.78 | 5.3 |

**Source:** Central Statistics Office, MoSPI, Government of India

# 4. The Five Dimensions of the S-JJI and How States Fare on Them

## State-wise Rescale Index Calculations

| State/ UT's | Employment | Formality | Benefits | Income Equality | Gender Equality |
|---|---|---|---|---|---|
| Andhra Pradesh | 88 | 46 | 39 | 52 | 62 |
| Bihar | 40 | 42 | 38 | 54 | 14 |
| Chhattisgarh | 95 | 22 | 14 | 83 | 67 |
| Delhi | 53 | 67 | 52 | 61 | 29 |
| Goa | 16 | 88 | 28 | 47 | 41 |
| Gujarat | 76 | 35 | 13 | 46 | 31 |
| Haryana | 52 | 42 | 18 | 61 | 41 |
| Himachal Pradesh | 69 | 39 | 41 | 41 | 73 |
| Jammu & Kashmir | 37 | 54 | 55 | 36 | 39 |
| Jharkhand | 66 | 21 | 23 | 68 | 46 |
| Karnataka | 82 | 43 | 21 | 64 | 51 |
| Kerala | 18 | 72 | 52 | 29 | 38 |
| Madhya Pradesh | 78 | 26 | 18 | 43 | 43 |
| Maharashtra | 77 | 38 | 29 | 77 | 65 |
| Odisha | 58 | 36 | 22 | 45 | 28 |
| Punjab | 41 | 46 | 32 | 62 | 30 |
| Rajasthan | 69 | 25 | 17 | 53 | 46 |
| Tamil Nadu | 69 | 67 | 29 | 41 | 57 |
| Uttarakhand | 44 | 50 | 51 | 73 | 46 |
| Uttar Pradesh | 52 | 17 | 31 | 39 | 21 |
| West Bengal | 58 | 46 | 23 | 69 | 21 |
| All India | 64 | 38 | 26 | 51 | 44 |

**Source:** JustJobs Network

## Dimension 1: Employment

In a country of over 1.3 billion people, with 361 million youth between the ages of 15 to 29 representing just under 27 percent of the country's population,[9] the starting point for research and discourse is inevitably: How many people are employed or looking for work? The first dimension of the S-JJI, *employment*, gauges quantity through three indicators: the labor force participation rate (LFPR); total unemployment rate and youth unemployment rate.

### Top Performer: Chhattisgarh and Andhra Pradesh

For the period between 2010 and 2018, Chhattisgarh performed consistently well on all three indicators in the employment dimension. The State recorded the highest dimension score of 95.29 followed by the Andhra Pradesh (88.35), Karnataka (81.63), Madhya Pradesh (77.83) and Maharashtra (76.50).

Chhattisgarh's high LFPR drives its performance on the employment dimension. Its LFPR increased from 61.4 percent in 2010 – the first year over the duration included in this study for which data is available, to 68.2 percent in 2015.[10] The LFPR decreased to 64.5 percent in 2018, but since the State's score on this indicator is a result of an average for all the available data points between the years 2010 and 2018, Chhattisgarh still fares well relative to other States.[11]

LFPR trends in Chhattisgarh vary in part by sector. In urban areas, LFPR for both males and females remained the same from 2012 to 2015. In 2018, urban males saw their LFPR rise from 72.1 percent in 2015 to 77.6 percent. This increase was likely driven by a construction boom in the State.[12] The share of urban males employed in the construction sector increased from 10.7 percent in 2015 to 16.8 percent in 2018.[13]

The LFPR for urban females, while far lower, also rose from 22.2 percent in 2015 to 30.5 percent in 2018. At the same time, the share of urban females employed in the agricultural sector also increased from 10.3 percent in 2015 to 21.3 percent in 2018.[14]

The LFPR for rural males remained the same between 2012-18. However, LFPR for rural females increased sharply from 52.2 percent in 2012 to 62.6 percent in 2015. This increase was driven by a rising share of rural females finding employment in agriculture. The share of rural females' employed in agriculture increased from 81.5 percent in 2012 to 92.4 percent in 2015. Following 2015, however, the LFPR of rural females declined to 54 percent in 2018 driven by a decline in the share that were employed in agriculture, which declined to 85.7 percent in 2018.[15]

### Need Improvement: Goa and Kerala

The State of Goa recorded the lowest dimension score of 15.88; a score slightly lower than Kerala's, which stood at 17.55. High levels of unemployment (13.9 percent for Goa and 11.4 percent for Kerala) and youth unemployment (28.7 percent for Goa and 36.3 percent for Kerala) in 2018 relative to other States drove the poor performance on this dimension. High unemployment rates among females in particular partially drive the overall unemployment figures in both States.

Figure 1

**Employment Dimension: Performance by State, 2019**
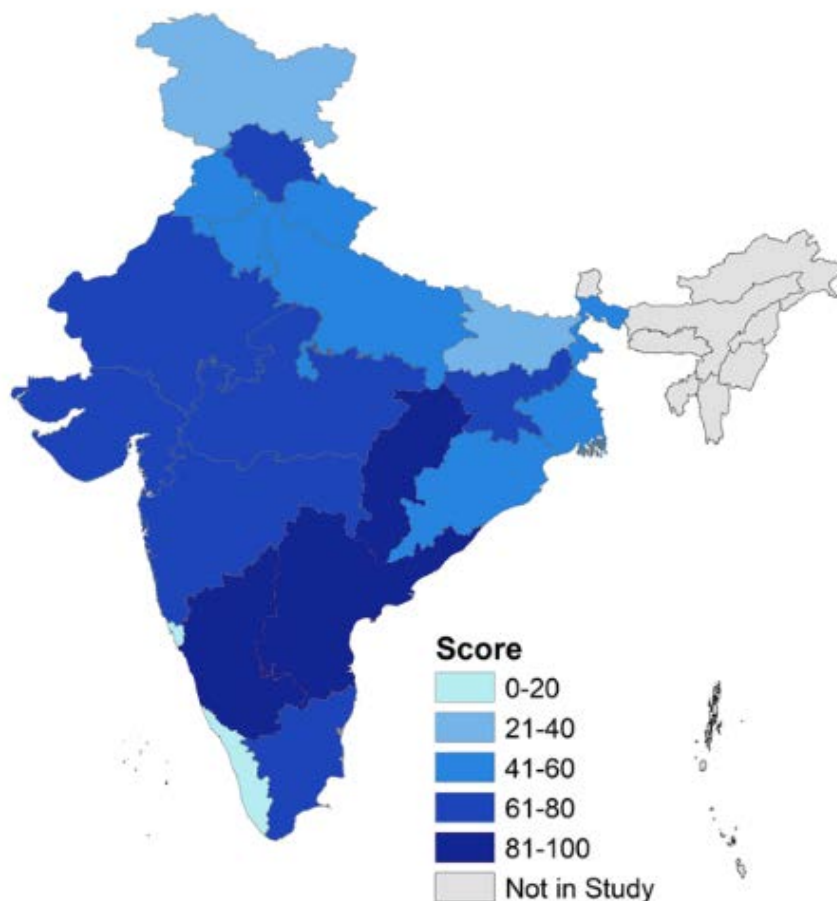


**Source:** JustJobs Network
**Note:** Scores are based on available data from 2010-2018. Scores for seven North-Eastern States were excluded due to their small sample sizes in available data.

In the State of Goa, unemployment was high for females across age groups and geographic areas. In 2018, 29.8 percent of urban females were unemployed, relative to 6 percent of urban males. Similarly, 21 percent of rural females were unemployed, relative to 10.7 percent of rural males in the same year. In regard to youth, 42.2 percent of urban female youth were unemployed, compared to 14.3 percent of urban male youth in 2018. Unemployment rates across education levels were higher than the national unemployment rate, except for those who had

a diploma/certificate or up to a level of primary education.[16]

In Kerala, the female youth unemployment rate was well above male youth for both rural and urban areas in 2018. In 2018, 61.7 percent of young rural females were unemployed, relative to 20.5 percent of young rural males. This runs contrary to the national trend where in 2018 a higher percentage of rural male youth were unemployed (17.4 percent) relative to rural female youth (13.6 percent).[17]

In urban areas in Kerala, 65.2 percent of female youth were unemployed in 2018, relative to 27.4 percent for urban male youth. The national unemployment rate for young urban women (27.2 percent) was higher than that of young urban men (18.7 percent) in 2018. Several factors underpin this trend, from a lack of opportunities, to obstacles such as safe transport and housing in urban areas.[18]

Kerala has the highest literacy rate in the nation.[19] But with education also comes the expectation of a better job. This is apparent from the fact that a rise in unemployment at the national level can largely be explained by the fact that more young people are acquiring an education.[20] Those that can afford to educate themselves also tend to be in a position to wait for the right job to come along. In step with this finding, in Kerala, the rate of unemployment was highest for persons with a university education, compared to other levels of education.[21] In 2018, 30.6 percent of graduates

and one in four post graduates in the labor force are unemployed, while one in five persons with a diploma/certificate were unemployed.[22]

High youth unemployment, particularly among the State's educated youth, is also symptomatic of a lack of demand in Kerala for workers with those qualifications. According to the State government, the high youth unemployment rate can be attributed to a lack of adequate skills and work experience in emerging sectors.[23]

Between 2010-17, employment in Kerala's organised sector remained the same, but employment in sectors that tend to hire informal or contractual workers such as construction, real estate, textiles, hospitality services and small scale industries grew.[24] Moreover, Kerala's average daily wage rate has been nearly double the national average over the past six years.[25] Demand for less-skilled workers, coupled with a high daily wage rate proves appealing to migrant workers. In 2015, Kerala had almost 25 lakh domestic migrant laborers (DML).[26]

## Dimension 2: Formality

Labor force participation rates, unemployment and youth unemployment – measures of the quantity of employment –alone are inadequate measures of labor market slack in a country with a large informal sector. Most people in India cannot afford to be unemployed; they have to work to sustain themselves. Among those who are working, informal employment as a share of

non-agricultural employment[iv] fell somewhat from 72.4 percent in 2012 to 68.4 percent in 2018.[27] By themselves, the indicators in the employment dimension do not capture pervasive underemployment and associated poor wages. As such, data on the quantity of employment is one side of the coin, while quality of work is the other side.  An assessment of both yields a more accurate picture of labor market health.

The discourse on quality of employment tends to shoehorn the massive heterogeneity of India's labor market into a tidy formal and informal binary. In reality, formality of employment in India is a continuum based on graduating levels of productivity, associated wages, social protection and tax compliance.

Most sources of labor market data on India classify workers into five types:[28]

**Own-account workers:** Persons who operate their own economic enterprises, or engage independently in a profession or trade, and hire no employees. Own-account workers are considered to be vulnerable.[v]

**Contributing family workers:** Workers in an economic enterprise operated by a related person living in the same household, generally without pay.  Contributing family workers are considered to be vulnerable workers.

**Regular wage/salaried workers:** Persons working in another's farm or non-farm enterprise, both household and non-household, and obtaining a regular salary or wages in return and not on the basis of daily or periodic renewal of a work contract.

**Casual workers:** Persons engaged in another's farm or non-farm enterprise, both household and non-household, and getting a wage in return according to the terms of a daily or periodic work contract.

**Contract workers:** Persons hired in connection with the work of an establishment by or through a contractor. Contract workers are indirect employees; persons who are hired, supervised and remunerated by a contractor that, in turn, is compensated by the establishment.

Own-account workers and contributing family workers tend to be relegated to the least productive jobs while regular wage and salaried workers tend to have the most productive jobs.[29]
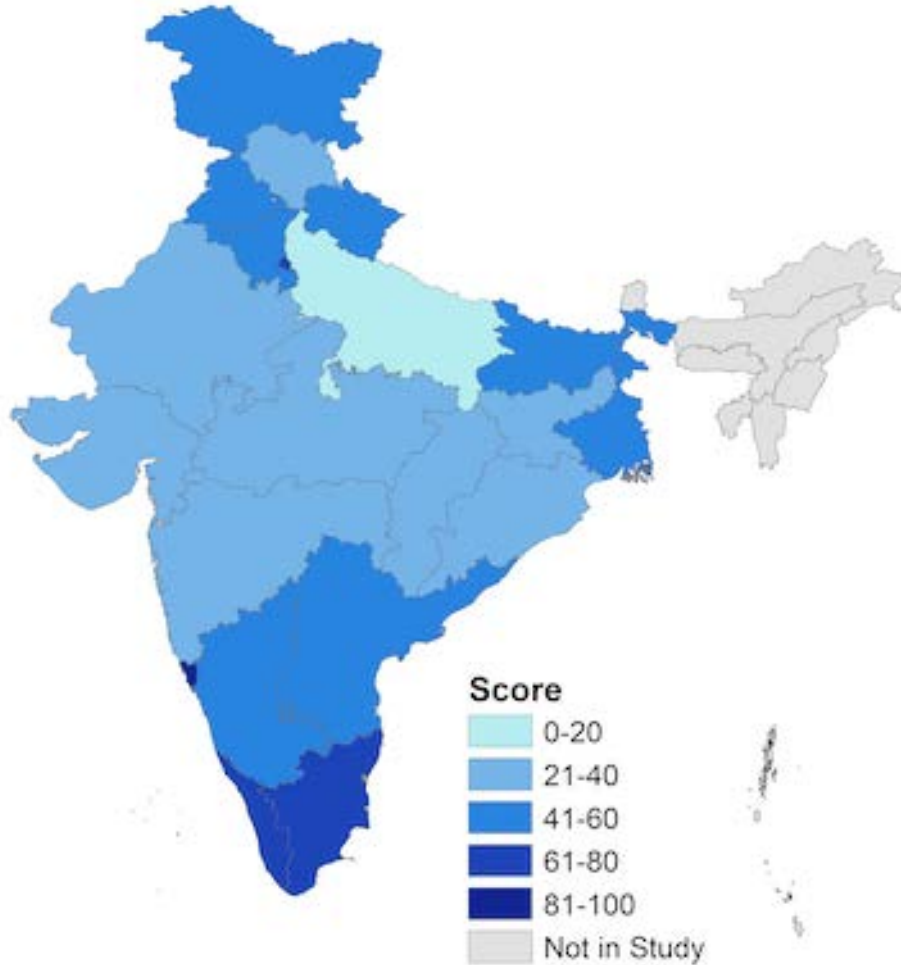
The employment continuum ranges from workers with contracts, health care and retirement benefits, to those with regular wages but no social protection, to daily wage workers with no written contracts and, thus, who can be dismissed at will. All of these categories of workers can be found with all types of employers, whether working for

Figure 2
**Formality Dimension: Performance by State, 2019**



Score

- 0-20
- 21-40
- 41-60
- 61-80
- 81-100
- Not in Study

**Source:** JustJobs Network
**Note**: Scores are based on available data from 2010-2018. Scores for seven North-Eastern states were excluded due to their small sample sizes in available data.

households, family firms, formal registered large enterprises or government agencies.[30]

The three indicators used to capture aspects of informality in Indian labor market include the following: share of own-account workers and contributing family workers in total employment, share of regular workers in total employment, and the share of workers (excluding those self-employed) who have a written job contract.

Table 4

## Distribution of Workers by Type and Sector of Employment, 2011-12

| | Informal | Formal | Domestic Worker | Total |
|---|---|---|---|---|
| Own Account Worker | 30.60 | 0.90 | 0.00 | 31.50 |
| Employer | 1.50 | 0.00 | 0.00 | 1.50 |
| Unpaid Family Worker | 7.10 | 0.20 | 0.00 | 7.30 |
| Regular Salaried | 14.30 | 19.40 | 1.30 | 35.00 |
| Casual Workers | 18.50 | 5.80 | 0.30 | 24.70 |
| Total | 72.00 | 26.40 | 1.60 | 100.00 |

**Source:** National Sample Survey Office. 2013. Employment and Unemployment, July 2011- June 2012. Ministry of Statistics and Programme Implementation.

There is a distinction between informal enterprises, and informal employment. In the PLFS and NSS reports, only proprietary and partnership (P & P) enterprises within the non-agriculture and AGEGC sectors are considered to be informal sector enterprises. While informal employment comprises, jobs held by:

• Own-account workers and employers who have their own informal sector enterprises

• Contributing family workers, irrespective of whether they work in formal or informal sector enterprises

• Employees who have informal jobs[vi] whether employed by formal sector enterprises, informal sector enterprises, or as paid domestic workers by households

• Members of informal producers' cooperatives

• Persons engaged in the own-account production of goods exclusively for own final use by their household, such as subsistence farming or construction of their own dwellings.

**Top Performers: Goa and Kerala**

As explained earlier, unemployment and informality tend to have an inverse relationship. Goa and Kerala, two States that fared poorly on the quantity of employment dimension, fared the best in keeping informality in check. Chhattisgarh has low levels of unemployment, but high levels of informality and thus scored poorly on the latter dimension.

Over the period of the study 2010-2018, The State of Goa performed consistently well on all three indicators of the formality dimension. The State recorded the highest dimension score of 87.59 followed by Kerala (71.57), Delhi (67.26) and Tamil

[vi] Employees are considered to have informal jobs if their employment relationship is, in law or in practice, not subject to national labor legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance pay, paid annual or sick leave, etc.).

Nadu (66.80). A high score on this dimension means lower levels of informality.

**Need Improvement: Uttar Pradesh and Jharkhand**

Uttar Pradesh recorded the lowest dimension score of 16.92, lower than Jharkhand (20.87), Chhattisgarh (22.37), Rajasthan (25.21) and Madhya Pradesh (26.32). Uttar Pradesh's performance was the worst of all States on all three indicators, except for Andhra Pradesh which scored worse on the indicator for the share of regular and contract workers with a written job contract.

Between 2012-18, the States of Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra and Rajasthan, among others, had a high share of own-account and contributing family workers. This may be ascribed to the fact that on average more than 60 percent of workers in these States were employed in agriculture sector, as well as wholesale and retail trade services. The agriculture sector and wholesale and retail trade services employs higher share of informal workers.[31]

In Andhra Pradesh, Chhattisgarh, Karnataka, Tamil Nadu and Uttar Pradesh, less than 15 percent of workers, excluding the self-employed, had a written job contract.[32] A major share of the workers in these States are employed as low-skilled elementary occupations workers, or they are employed as skilled agricultural and fishery workers.[vii]

## Dimension 3: Benefits

A quality job is one that helps workers realize their productive potential. This entails making sure that workers have social protection as well as access to collective bargaining as a means to negotiate better conditions.

Collective bargaining refers to "all negotiations which take place between an employer, a group of employers or one or more employers' organizations, on the one hand, and one or more workers' organizations, on the other hand."[33] India has an estimated 16,000-20000 trade unions with a collective membership of about 10-75 million.[34] While the sheer number of trade unions points to a vibrant trade – though fragmented -- union movement, the fact that only two percent of the workforce is unionized does not speak well of the collective power of workers. When effectively implemented in law and in practice, freedom of association and collective bargaining can facilitate better wage setting, improved working conditions and greater equality, which ultimately fuel productivity and growth.

Currently only about seven percent of the Indian labor force has social insurance – that is, access to retirement, death and disability and maternity benefits. Even some workers in organized sector enterprises also lack social insurance.[35]

The benefits dimension is comprised of three indicators: State expenditure on pensions as a percentage of Gross State Domestic Product

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[vii] Based on NCO-2008, Elementary occupation includes a) sales and services elementary occupations, b) agricultural, fishery and related laborers, and c) laborers in mining, construction, manufacturing and transport.
Skilled agricultural and fishery workers include a) market oriented skilled agricultural and fishery workers, and b) subsistence agricultural and fishery workers.

Figure 3
**Benefits Dimension: Performance by State, 2019**
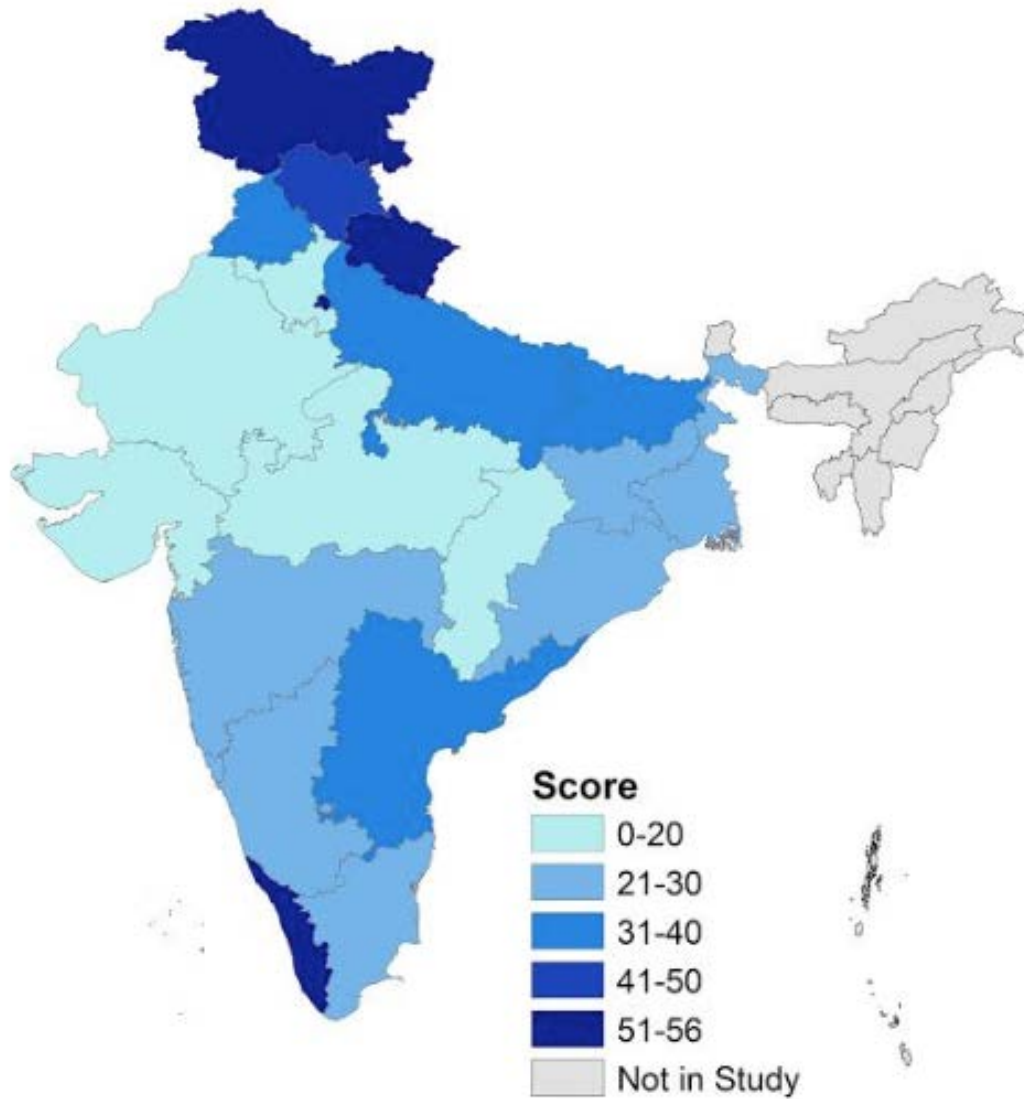


**Score**
- 0-20
- 21-30
- 31-40
- 41-50
- 51-56
- Not in Study

**Source:** JustJobs Network
**Note**: Scores are based on available data from 2010-2018. Scores for seven North-Eastern states were excluded due to their small sample sizes in available data.

(GSDP); share of workers who have a union association, excluding the self-employed; and the share of workers with a Provident Fund/pension contribution excluding the self-employed.

**Top Performer: Jammu & Kashmir, Delhi and Kerala**

The State of Jammu & Kashmir recorded the highest dimension score of 55.47 followed by Delhi (52.47), Kerala (51.99) and Uttarakhand (50.64). The high score of Jammu & Kashmir is a result of the State's high expenditure on pensions as a percentage of GSDP, and high numbers of regular and contract workers that are members of union associations.

In the case of Kerala, the high proportion of regular and contract workers with union associations, which is second highest in India after Delhi, drove Kerala's high benefits.[36] Gujarat has recorded the lowest score of 12.67, less than Chhattisgarh (14.14), Rajasthan (17.19), Madhya Pradesh (17.78) and Haryana (18.16).

**Needs Improvement: Gujarat and Chhattisgarh**

Though Gujarat has fared poorly on all three indicators of the benefits dimension, its low score on the share of workers with a union association (excluding the self-employed) drives the low score.

In Gujarat, a higher proportion of wage/salaried workers tend to be unionized compared to contract or casual workers. However, among wage/salaried workers, the share has fallen from 37.1 percent in 2010 to 23.8 percent in 2012. The decrease for males, from 36.2 percent in 2010 to

23.1 percent in 2012, was more than for females, which fell from 39.8 percent in 2010 to 28.5 percent in 2012. Similarly, the share of workers with benefits also decreased among casual workers, from 10.4 percent in 2010 to 2.5 percent in 2012, though the decrease was much larger for males compared to females.[37]

Chhattisgarh has fared poorly on all three indicators of the benefits dimension. The States has scored lowest in the country on the share of workers with a union association (excluding the self-employed), in particularly which is driving the low score.

## Dimension 4: Income equality

The fact that greater equality in income distribution is associated with longer periods of economic growth is well established.[38] Yet India struggles with income inequality, which stood at 0.32 in 2012.[39] Those at the bottom of the spectrum who are unable to access quality health, hygiene, nutrition and education get trapped in a persistent cycle of deprivation. Wage levels and differentials are among the most important determinants of income inequality; changes in wages have a significant bearing on shifts in income inequality.[40]

The income equality dimension consists of three indicators: ratio of minimum wages to average real wages, Gini coefficient of consumption inequality,[viii] and the ratio of informal wages to average wages. Credible income data is difficult to come by, so the authors use consumption expenditure data from the National Sample

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[viii] Gini coefficient of consumption inequality is a measure of the deviation of the consumption expenditure among individuals or households within a country, from a perfectly equal distribution.

Figure 4
**Income Equality Dimension: Performance by State, 2019**
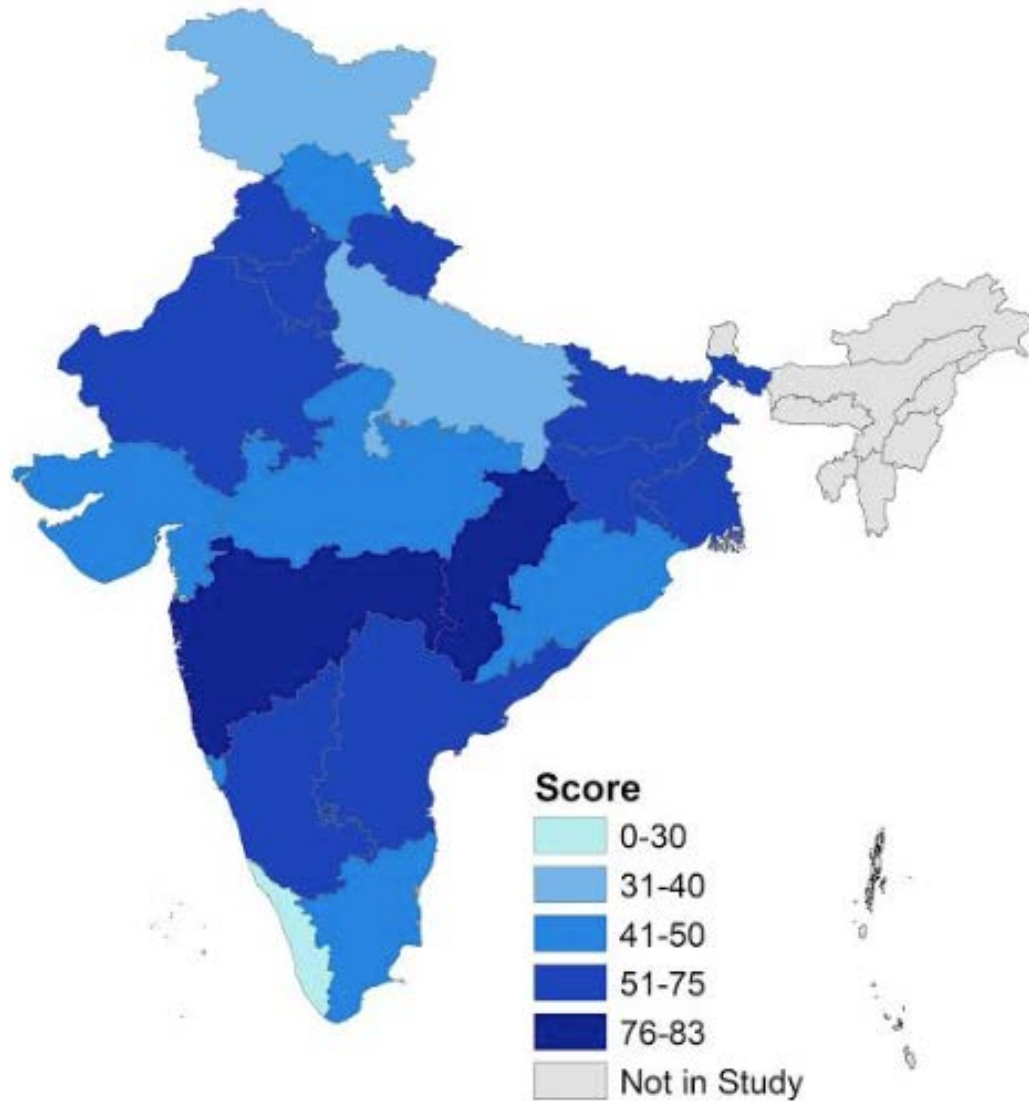


**Source:** JustJobs Network
**Note**: Scores are based on available data from 2010-2018. Scores for seven North-Eastern states were excluded due to their small sample sizes in available data.

Surveys to calculate consumption-based inequality in Indian States. The value of inequality varies between zero to one, with zero indicating perfect equality, and one indicating perfect inequality.

Wage and income inequities persist for several reasons. The recently released Periodic Labor Force Survey confirms that at the all-India level across both rural and urban areas and types of employment, men earn more than women for the same work. These findings are explored in further detail in the gender equality section.

In rural areas, a male regular wage/salaried employee earned approximately 1.5 times more than his female counterpart. In urban areas, a male regular wage/salaried employee earned approximately 1.2 times more. Similarly, a rural, male casual laborer, engaged outside of public works,[ix] earned about 1.5 times per day more than the earnings of his female counterpart. In urban areas, this was 1.7 times more.[41]

**Top Performers: Chhattisgarh and Maharashtra**

Based on available data between 2010 and 2015, Chhattisgarh, Maharashtra and Uttarakhand performed consistently well on each indicator of the income equality dimension. Chhattisgarh recorded the highest dimension score of 83.03 followed by the States of Maharashtra (76.84) and Uttarakhand (73.39).

**Need Improvement: Kerala and Jammu & Kashmir**

With a score of 28.85, Kerala recorded the lowest dimension score, less than Jammu & Kashmir (36.24) and Uttar Pradesh (39.45). Kerala performed poorly on all three indicators, but a high Gini coefficient of consumption inequality is the main driver of the low dimension score. Kerala has the highest levels of consumption inequality in the country. This runs counter to the fact that Kerala has the second lowest poverty rate in the country after Goa, though pockets within the State record a high incidence of poverty.[42]

The high rate of consumption inequality is driven by the high amount of consumption by the top five percentiles in particular, relative to consumption by the bottom percentiles.

Between 2011 and 2014, Kerala saw a drastic increase in household remittances.[43] This is driving the high incomes of the top 5 percentiles.[44] In 2014, Kerala received about $3857.3 million in household remittances. Despite this high figure, remittances accrued to only 17 percent of all households in the State. Only a small fraction of households are direct beneficiaries of remittances flowing into Kerala.[45]

### Dimension 5: Gender Equality

Only one in two Indians of working age, 15 years and above, participate in the labor force—this partly reflects a major gender disparity. Fewer than one in four women 15 years and above -- 23.3 percent -- enter the labor market.[46] Female labor force participation has declined consistently since 2004, when it was 42.7 percent.[47] This drop

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[ix] Public works were those activities which were sponsored by Government or Local Bodies, and which cover local area development works as relief measures, or as an outcome of employment generation schemes under the poverty alleviation programmes.

can be attributed to several factors ranging, for example, from girls staying in education longer and delaying their entry into the labor market, to the 'middle income effect'. A lack of demand from female friendly industries such as apparel and footwear, and continuing social disapproval are both important factors.[48] Other culprits include migration and the nuclearization of families, whereby there are fewer women in the household to contribute to domestic work. Female or male, low labor force participation is a loss of precious productive potential.

The gender equality dimension is comprised of three indicators: ratio of female to male employment rates, ratio of female to male labor force participation rates, and the ratio of female to male average real wages. Raising female participation in the labor force and closing the wage gap between women and men will boost long-term productivity, which in-turn has a positive impact on growth. Estimates suggest that harnessing the economic contributions of women could add up to 27 percent to GDP.[49]

**Top Performers: Himachal Pradesh and Chhattisgarh**

The states of Himachal Pradesh (72.90), Chhattisgarh (67.12), Maharashtra (64.78) and Andhra Pradesh (62.08) perform relatively well on all three indicators of this dimension. In addition, the States that have performed better on the gender equality dimension have a better score on the overall index. This points to the strength of gender equity as a driver of general economic progress.

**Need Improvement: Bihar, Uttar Pradesh and Punjab**

With a score of 13.50, Bihar scored the lowest on this dimension, followed by Uttar Pradesh at 21.01. Both States also rank the lowest on the overall index, scores on the gender equality dimension have a direct correlation with the overall State-level JustJobs Index. This correlation highlights the significance of equal participation of women in the economy. Raising women on an equal footing to men in employment will help build a more equal, more productive and resilient economy.

The State of Punjab fared poorly on the ratios of female to male employment and female to male labor force participation. The female LFPR of Punjab 15.5 percent is much lower than the national average of 23.3 percent in 2018.

Employment in the agriculture sector appears to be linked to overall female employment. Between 2012-15, Punjab had the third lowest average annual rate of agriculture growth at 0.5 percent, after Kerala and Jammu & Kashmir. Poor agricultural performance appears linked to the decline of the share of rural females employed in agriculture, from 47.1 percent in 2012 to 26.2 percent in 2015. The share of rural males employed in agriculture also declined from 59 percent in 2012 to 49.6 percent in 2015. At the same time, the share of rural females employed in household activities increased from less than 1 percent in 2012 to 11.6 percent in 2015. However, from 2016-18, the average annual rate of agricultural growth has increased to 5.7 percent. Female and male labor force participation as well as the share of female and male workers employed in agricultural sector have also increased.

Figure 5
**Gender Equality Dimension: Performance by State, 2019**
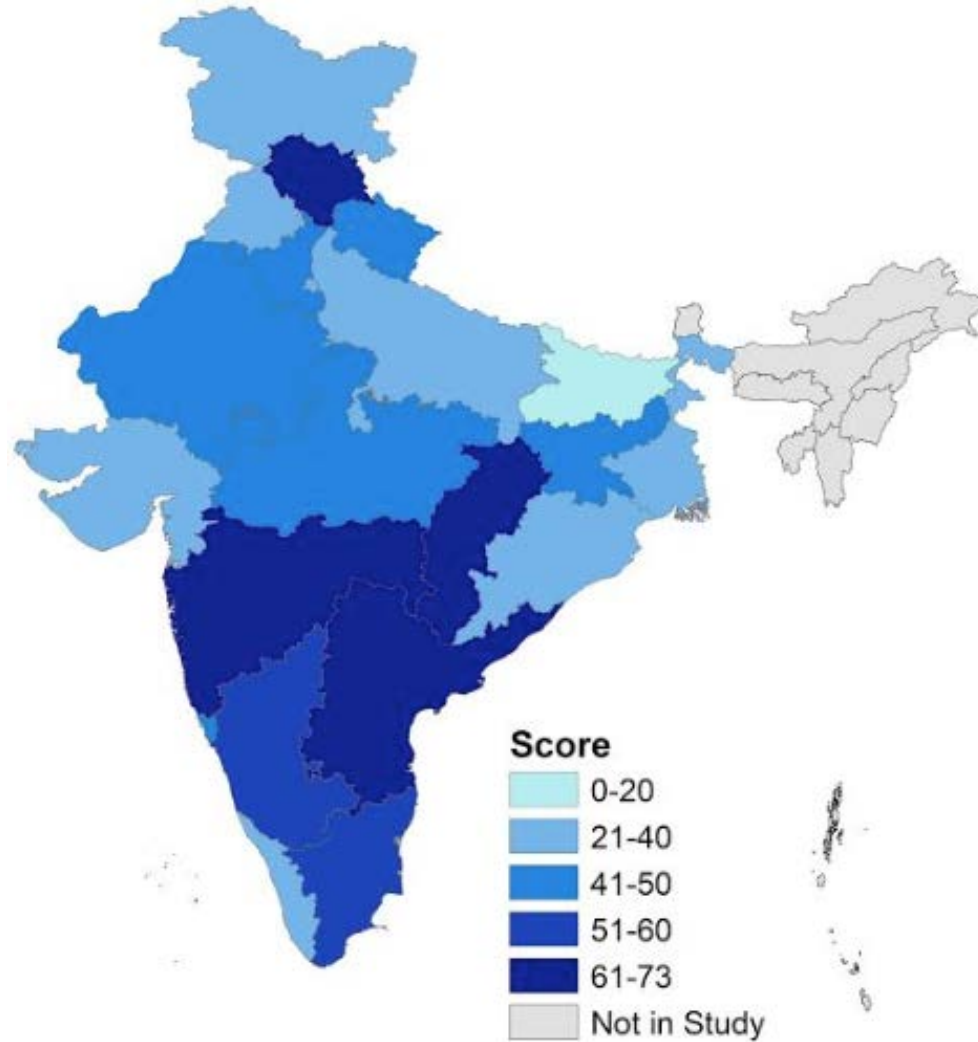


**Source:** JustJobs Network
**Note**: Scores are based on available data from 2010-2018. Scores for seven North-Eastern states were excluded due to their small sample sizes in available data.

# 5. State-wise Rankings

Scores on the five dimensions taken together culminate in a ranking that has Andhra Pradesh, Maharashtra and Chhattisgarh at the top; and Odisha, Bihar and Uttar Pradesh at the bottom. Andhra Pradesh's high scores for employment and gender equality, coupled with average scores in the three remaining dimensions, have helped it to the top rank. Maharashtra's consistently high performance in all dimensions, with the exception of benefits, has driven it to second rank. Chhattisgarh's high scores for employment, income equality and gender equality have contributed to its ranking as the third highest overall, though its performance on benefits and informality have been among the worst.

Uttar Pradesh ranked in the bottom three in the informality, income equality and gender equality, with a higher score for employment. The State's cumulative score resulted in it having the bottom-most rank. The low score of Bihar on all dimensions, except the income equality dimension, drove it to the bottom. And for Odisha, all dimensions, with the exception of the employment dimension, drove its ranking down.

The many limitations of an index notwithstanding, this composite Index captures several multi-dimensional concepts by combining different indicators in a standardized way, and yields a single measure of the state of employment at the State level in India. Overtime, this Index will enable better examination of trends within and across States and the association of performance to broader conditions, especially as more time series data becomes available. These analyses will provide valuable insight into what policies drive change, and help to chart successful paths for more and better job creation.

As noted in the introduction, indices are often criticized. One reason is that the weights in an Index can reflect subjective priorities, and can be changed to alter the rankings. To circumvent this criticism, the JustJobs Network has constructed a web portal to accompany this report that allows uses to change the weights of the S-JJI and alter the rankings.

**Table 6** provides an illustration of how State ranks change if 80 percent of the weight is attributed to the employment dimension and the remaining dimensions are ascribed weights worth five percentage points.

Figure 6
**Overall Index: Performance of State, 2019**
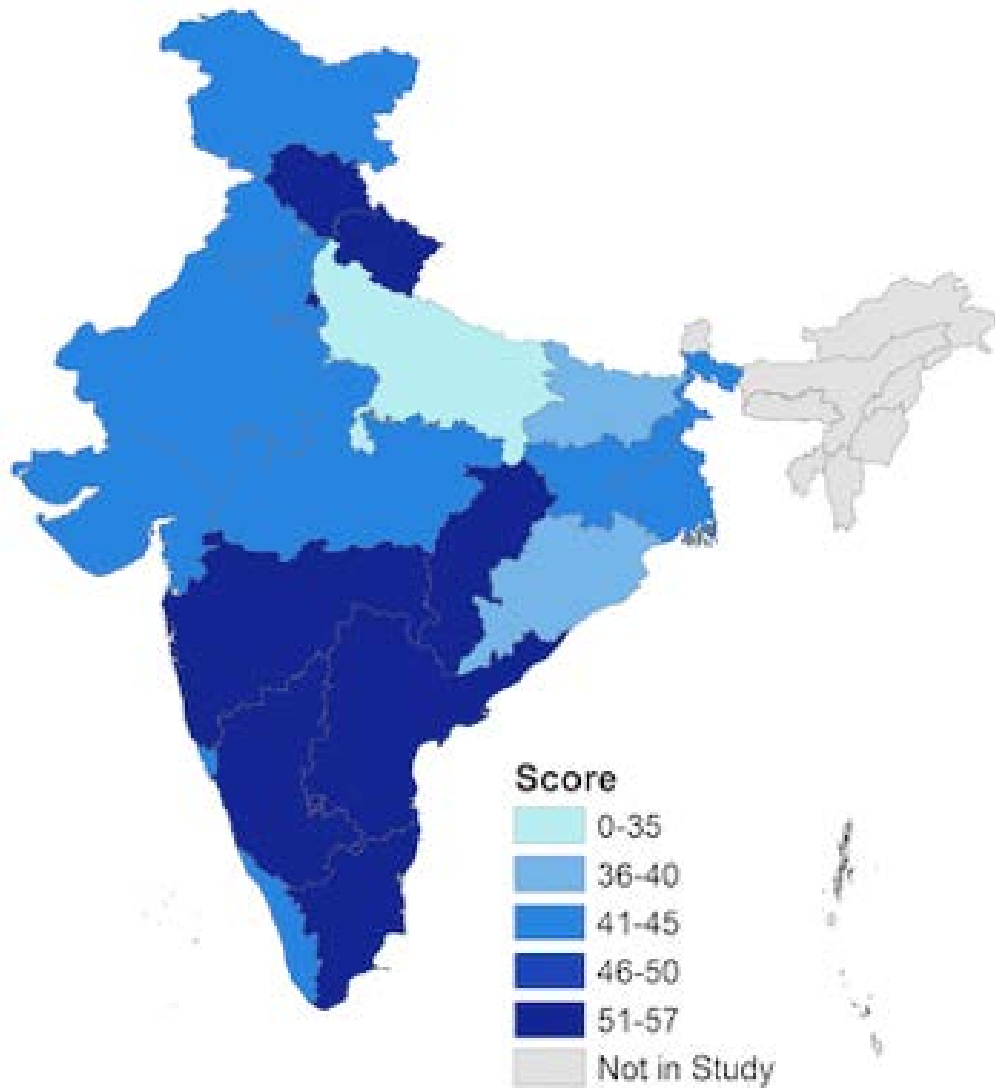


**Source:** JustJobs Network
**Note**: Scores are based on available data from 2010-2018. Scores for seven North-Eastern states were excluded due to their small sample sizes in available data.

Table 5

## State-wise Final Rescale Index and Ranking

| Rank | State/ UT's | Index |
|------|-------------|-------|
| 1 | Andhra Pradesh | 57.38 |
| 2 | Maharashtra | 57.20 |
| 3 | Chhattisgarh | 56.39 |
| 4 | Tamil Nadu | 52.74 |
| 5 | Karnataka | 52.65 |
| 6 | Delhi | 52.61 |
| 7 | Uttarakhand | 52.58 |
| 8 | Himachal Pradesh | 52.12 |
|  | All India | 44.58 |
| 9 | Jharkhand | 44.39 |
| 10 | West Bengal | 44.32 |
| 11 | Jammu & Kashmir | 43.88 |
| 12 | Haryana | 43.63 |
| 13 | Goa | 42.64 |
| 14 | Punjab | 42.05 |
| 15 | Rajasthan | 42.05 |
| 16 | Kerala | 41.59 |
| 17 | Madhya Pradesh | 41.58 |
| 18 | Gujarat | 40.26 |
| 19 | Odisha | 37.70 |
| 20 | Bihar | 37.28 |
| 21 | Uttar Pradesh | 32.04 |

Table 6

## Changing Weights & Modified Ranks: An Example

| State/ UTs | Employ-ment | Formality | Benefits | Income | Gender | JJ Index | Modified JJ Index | S-JJI Rank | Modified S-JJI Rank |
|---|---|---|---|---|---|---|---|---|---|
| Andhra Pradesh | 88.35 | 45.59 | 38.98 | 51.90 | 62.08 | 57.38 | 80.61 | 1 | 2 |
| Maharashtra | 76.50 | 38.44 | 29.43 | 76.84 | 64.78 | 57.20 | 71.68 | 2 | 4 |
| Chhattisgarh | 95.29 | 22.37 | 14.14 | 83.03 | 67.12 | 56.39 | 85.57 | 3 | 1 |
| Uttarakhand | 44.14 | 49.75 | 50.64 | 73.39 | 45.78 | 52.74 | 46.29 | 4 | 15 |
| Tamil Nadu | 68.96 | 66.80 | 29.25 | 41.40 | 56.86 | 52.65 | 64.88 | 5 | 8 |
| Delhi | 53.34 | 67.26 | 52.47 | 60.71 | 29.26 | 52.61 | 53.15 | 6 | 12 |
| Himachal Pradesh | 69.40 | 38.77 | 40.92 | 40.91 | 72.90 | 52.58 | 65.19 | 7 | 7 |
| Karnataka | 81.63 | 42.77 | 21.49 | 64.15 | 50.56 | 52.12 | 74.25 | 8 | 3 |
| Jharkhand | 65.64 | 20.87 | 22.76 | 67.59 | 46.02 | 44.58 | 60.38 | 9 | 10 |
| Jammu & Kashmir | 37.07 | 53.56 | 55.47 | 36.24 | 39.27 | 44.32 | 38.88 | 10 | 19 |
| Goa | 15.88 | 87.59 | 27.96 | 47.03 | 40.94 | 43.88 | 22.88 | 11 | 21 |
| West Bengal | 58.45 | 46.39 | 23.38 | 68.95 | 21.01 | 43.63 | 54.74 | 12 | 11 |
| Haryana | 51.53 | 41.53 | 18.16 | 60.80 | 41.17 | 42.64 | 49.31 | 13 | 14 |
| Punjab | 41.05 | 46.32 | 31.67 | 61.70 | 29.51 | 42.05 | 41.30 | 14 | 17 |
| Rajasthan | 68.77 | 25.21 | 17.19 | 52.98 | 46.08 | 42.05 | 62.09 | 15 | 9 |
| Madhya Pradesh | 77.83 | 26.32 | 17.78 | 43.43 | 42.60 | 41.59 | 68.77 | 16 | 5 |
| Kerala | 17.55 | 71.57 | 51.99 | 28.85 | 37.93 | 41.58 | 23.55 | 17 | 20 |
| Gujarat | 75.86 | 35.27 | 12.67 | 46.31 | 31.17 | 40.26 | 66.96 | 18 | 6 |
| Odisha | 57.80 | 36.15 | 22.11 | 44.83 | 27.64 | 37.70 | 52.78 | 19 | 13 |
| Bihar | 39.68 | 41.84 | 37.58 | 53.78 | 13.50 | 37.28 | 39.08 | 20 | 18 |
| Uttar Pradesh | 51.73 | 16.92 | 30.70 | 39.45 | 21.38 | 32.04 | 46.80 | 21 | 16 |
| All India | 63.68 | 37.70 | 25.54 | 50.96 | 44.10 | 44.39 | 58.86 | | |

# 6. Conclusion

Cultivating livelihoods was a cornerstone of Prime Minister Modi's platform in its first term, but interventions have been complicated by the country's vast scale, enormous regional diversity, and endemic problems with policy design and implementation.

At the central level, the nation needs a National Employment Strategy[50] that lays down specific goals to generate productive and well-remunerated jobs, which entails making public allocations to support sectors that absorb more labor. Such a strategy should ensure that the government's budget invests in its workers with enduring, long-term investments in human capital, through good quality education, skills and on-the-job training. Strengthened labor market institutions are also critical—including thoughtful reform of labor regulations, the implementation of a statutory minimum wage, and the provision of social protections, especially universal healthcare.

But top-down centralized approaches will only enjoy limited success in application. Job creation strategies must be rooted in the assets and needs of smaller administrative units. The State-level JustJobs Index is a step in this direction. It is a tool that can underpin a National Employment Strategy that provides specific direction to states and the nation on how to improve economic opportunity and outcomes.

Section 2 developed the theoretical framework underpinning the State JustJobs index. The following section discusses various steps involved in the construction of the S-JJI in detail.

**Selection of indicators**

The strength and the weakness of an index is determined by the quality of the selected indicators. The quality of indicators, in-turn, strictly depends on the quality of available data. The selection of indicators was based on the State JustJobs theoretical framework, measurability of indicators, the cross-state quality of data of these indicators and the relevance of the indicators to the phenomenon being measured based on the nature of the Indian labor market.

**Normalization of data**

Normalization of data is required prior to any data aggregation so that all the inputs are in a comparable range. The indicators are expressed in terms of percentage, ratio and currency units. In order to construct the index, the available data needs to be in a standardized form so as to be combined in one index. A number of normalization techniques exist are ranking; standardization (or z-scores); Min-Max rescale and distance to a reference. Based on the methodology and characteristics of the selected indicators, the various techniques that will be used include standardized (or z-scores) and min-max rescale.

### Construction of composite index

After the completion of normalization process, the next step is to construct the State JustJobs index. In order to construct the composite index, we have attributed equal weights to all dimensions and indicators. Hence, we will calculate the composite index by taking a simple arithmetic mean using an additive average of all the normalized indicators within each dimension. A composite index is then calculated by a simple average of the resulting values of the five dimensions.

### Sensitivity analysis

Sensitivity analysis helps in evaluating the robustness of an index and improves transparency by assessing the contribution of each individual indicator to the index variance. Sensitivity analysis is carried out to assess the relevance of each included indicator as well as selection of the appropriate normalization technique. Based on the results of the sensitivity tests, we will select one normalization technique and will construct final indices by the selected technique.

### Normalization of data

Out of four possible normalization techniques only two have been employed to standardize the various indicators included in the construction of the State JustJobs index. The composite index is based on the average of a nine-year period, therefore the ranking technique[x] and distance to a reference[xi] has been eliminated. Hence, the two normalization techniques that are used are standardized, or z-scores and min-max rescale.

### A. Standardization (z-scores)

Standardization is a process of converting raw data of indicators into a scale with a mean of zero and standard deviation of one. The extreme values i.e. greater than 3 have a greater effect on the index and hence this method generates outlier behavior. The formula used for the standardization method is given by:

$$\text{High: } Z_t^i \quad = \quad \frac{x_t^i \ - \ \widehat{x^i}}{\sigma^i}$$

$$\text{Low: } Z_t^i \quad = \quad \frac{\widehat{x^i} \ - \ x_t^i}{\sigma^i}$$

$$\text{Equal to a: } Z_t^i = \quad \frac{\overline{|x_t^i \ - \ a|} \ - \ |x_t^i - \ a|}{\sigma^i}$$

---

x  Ranking technique - This method of standardization measures the performance of the states over time in terms of relative positions, which constitute the rankings. The formula for the ranking method is given by:

$$\text{High: } Z_t^i \quad = \quad \frac{x_t^i \ - \ \widehat{x^i}}{\sigma^i}$$

$$\text{Low: } Z_t^i \quad = \quad \frac{\widehat{x^i} \ - \ x_t^i}{\sigma^i}$$

$$\text{Equal to a: } Z_t^i = \quad \frac{\overline{|x_t^i \ - \ a|} \ - \ |x_t^i - \ a|}{\sigma^i}$$

xi  Distance to a reference - This method measures the relative position of a given indicator to a reference point. In this report, the reference point will be a State, in which the reference state receives 1 for all indicators and others are given percentage points away from referral State. However, this method is based on extreme values which could lead to unreliable outliers. The formula used for the distance to a reference is given by:

$$\text{High: } Z_t^i \quad = \quad \frac{x_t^i \ - \ \min_t(x_t^i)}{\max_t(x_t^i) \ - \ \min_t(x_t^i)}$$

$$\text{Low: } Z_t^i \quad = \quad \frac{\max_t(x_t^i) \ - \ x_t^i}{\max_t(x_t^i) \ - \ \min_t(x_t^i)}$$

$$\text{Equal to a: } Z_t^i \quad = \quad \frac{\max_t(|x_t^i - a|) \ - \ |x_t^i - a|}{\max_t(|x_t^i - a|) \ - \ \min_t(|x_t^i - a|)}$$

The high refers to an indicator whose preferred value is high (e.g. labor force participation rates, share of regular workers in total employment); low refers to an indicator whose preferred value is low (e.g. unemployment rates, share of own-account workers); "Equal to a" refers to an indicator whose preferred value is a specific one (e.g. ratio of female to male real wages, ratio of female to male employment rates).

**B. Min-Max rescale**

This method provides the linear transformation of raw data of an indicator in a given identical range from zero to one. The range zero to one has been transformed into zero to 100 in order to make the analysis in the report similar to that of the online dashboard accompanying this report. The formula used for the min-max rescale method is given by:

$$\text{High: } Z_t^i \quad = \quad \frac{x_t^i \quad - \quad \min_i(x_t^i)}{\max_i(x_t^i) \quad - \quad \min_i(x_t^i)}$$

This is the default for most indicators, except as mentioned below.

$$\text{Low: } Z_t^i \quad = \quad \frac{\max_i(x_t^i) \quad - \quad x_t^i}{\max_i(x_t^i) \quad - \quad \min_i(x_t^i)}$$

Indicators number 2, 3, 7 and 11 in the following table use the above formula.

$$\text{Equal to a: } Z_t^i \quad = \quad \frac{\max_i(|x_t^i - a|) \quad - \quad |x_t^i - a|}{\max_i(|x_t^i - a|) \quad - \quad \min_i(|x_t^i - a|)}$$

The gender dimension (indicators, 13, 14 and 15) uses the above formula.

**Robustness and Sensitivity Tests**

Sensitivity tests are performed to check the robustness of the composite index. The sensitivity test represents how much uncertainty in the index score for a given State is reduced if a particular indicator, or the source of uncertainty, is removed. The sensitivity test explores the effect of deleting each indicator, one at a time, and examining its impact on the relative ranking. The main aim of the sensitivity tests is to measure the relative shift in the position of a State in the ranking by eliminating a given indicator.

The formula used for the sensitivity test is:

$$\bar{R} \quad = \quad \frac{1}{n} \sum_{c=1}^{c} |Rank_{one\ indicator\ deleted}\ (CI_c) \quad - \quad Rank_{complete\ set}\ (CI_c)|$$

In addition, we also use a sensitivity test will be conducted to explore how the States' rankings change when one normalization method is used over another.

## List of Indicators, Definitions and Data Sources

| Sl No. | Indicators | Definitions | Data sources | Year of data availability |
|---|---|---|---|---|
| 1 | Labor force participation rate | The labor force participation rate is defined as the ratio of the labor force to the working age population (15 and above), expressed as a percentage. The labor force is the sum of the number of persons employed and the number of persons unemployed – that is, those out of a job but actively seeking work. In this report for the calculation of the index, the authors have used usual principal status and subsidiary status (ps+ss) data for LFPR. Usual Principal Status and Subsidiary Status approach (ps+ss) is an extension to the principal status approach. If a person has engaged in any economic activity for a period of 30 days or more during the preceding 365 days a person is considered as employed under this approach. | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 2 | Unemployment rate (low is better) | The proportion of people active in the labor force who are out of a job and actively looking, expressed as a percentage. It Includes anyone 15 years of age and above. The authors have used usual principal status and subsidiary status (ps+ss) data for unemployment rate. | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 3 | Youth unemployment rate (low is better) | Defined in the same way as total unemployment but covering only those persons aged 15 to 29 years. The authors have used usual principal status and subsidiary status (ps+ss) data for youth unemployment rate. | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 4 | Share of Regular and Contract workers as a member of Union association | Employees covered by collective (wage) bargaining agreements as a percentage of all wage and salary earners in employment with the right to collective bargaining. | Informal sector & conditions of employment in India, NSSO | 2009-10 and 2011-12 |
| 5 | State expenditure on pension as percentage of GDP | Total State expenditure on old age pension, as a proportion of total SGDP. | RBI | 2009-10 to 2016-17 |

| SI No. | Indicators | Definitions | Data sources | Year of data availability |
|---|---|---|---|---|
| 6 | Share of employees with PF/pension contribution except self-employed | The share of workers except self-employed having PF/pension contribution. | LBGOI, NSSO | 2011-12 and 2015-16 |
| 7 | Share of own-account workers and contributing family workers in total employment (low is better) | Own-account workers are persons who operate their own economic enterprises, or engage independently in a profession or trade, and hire no employees. Own-account workers are generally vulnerable; therefore, the higher this percentage, the worse a State's performance on the index. The proportion of all employed workers who are contributing family workers. These workers labor in an economic enterprise operated by a related person living in the same household, generally without pay. Where it is customary for young persons to work without pay in an economic enterprise operated by a related person who does not live in the same household, the requirement of "living in the same household" may be eliminated. As these workers are considered vulnerable, the higher this percentage the worse a State's score on the index. | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 8 | Share of regular workers in total employment | Regular workers are those who come under the purview of labor laws, whereas non-regular workers are excluded in most of the pro-worker labor legislations such as employment protection laws etc. | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 9 | Share of workers except self-employed with written job contract | The casual and regular workers having a written job contract. | LBGOI & NSSO | 2009-10, 2011-12 and 2015-16 |

| Sl No. | Indicators | Definitions | Data sources | Year of data availability |
|--------|-----------|-------------|--------------|---------------------------|
| 10 | Ratio of minimum wages to real average monthly wages | State-wise minimum wages as per labor bureau divided by average monthly wages. | Informal sector & conditions of employment in India, NSSO and Report on Minimum wages, Labor Bureau. | 2009-10 and 2011-12 |
| 11 | Gini coefficient of consumption inequality (low is better) | It measures the inequality in consumption pattern across the States. | NSSO | 2009-10 and 2011-12 |
| 12 | Ratio of informal wages to formal wages. | State-wise informal wages divided by formal monthly wages. | Informal sector & conditions of employment in India, NSSO and ASI. | 2009-10 and 2011-12 |
| 13 | Ratio of female-to-male employment rates | Female employment-to-population ratio (ages 15+) divided by male employment-to-population ratio (ages 15+). | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 14 | Ratio of female-to-male labor force participation rates | Female labor force participation rate (ages 15+) divided by male labor force participation rate (ages 15+) | LBGOI, NSSO & PLFS | 2009-10, 2011-12, 2012-13, 2013-14, 2015-16 and 2017-18 |
| 15 | Ratio of female-to-male wages | The average wages for female divided by the average wages for male | Informal sector & conditions of employment in India, NSSO | 2009-10 and 2011-12 |

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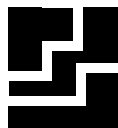
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