



Munich Personal RePEc Archive

Tax Transfers and Demographic Transition: Empirical Evidence for 16th Finance Commission

Singh, Yadawendra and Chakraborty, Lekha

NIPFP, NIPFP

7 August 2024

Online at <https://mpra.ub.uni-muenchen.de/121658/>
MPRA Paper No. 121658, posted 09 Aug 2024 10:51 UTC

Tax Transfers and Demographic Transition: Empirical Evidence for 16th Finance Commission

Yadawendra Singh¹
Lekha Chakraborty

Abstract

Against the backdrop of demographic transition in India, the study highlights the necessity of integrating the elderly population as a critical factor in formula-based intergovernmental fiscal transfers. The demographic transition, characterized by an increasing elderly population, imposes unique fiscal challenges on states, necessitating a revision of transfer formulas to ensure equitable and efficient resource distribution. The paper employs a historical analysis of fiscal devolution criteria, and analysing the impact of incorporating the elderly population into the devolution formula on the share of states in the total tax transfer to states. The findings indicate that integrating the elderly population into the tax devolution formula can significantly alter the distribution of resources among states, with states having higher shares of elderly populations benefiting more. The study recommends that there is a need to consider demographic changes by incorporating the share of elderly population to working age population ratio as a criterion by the Sixteenth Finance Commission to promote a more equitable and efficient allocation of resources.

¹ Yadawendra Singh, former young professional of 14th Finance Commission is currently Assistant Professor, CM College, Darbhanga and Chakraborty is Professor at NIPFP. Thanks are due to Professor Pinaki Chakraborty, Professor Irudaya Rajan and Professor Shailaja Fennel of University of Cambridge for valuable discussions. Thanks are due to Amita Manhas for editorial support.

Introduction

Intergovernmental fiscal transfers have been a cornerstone of fiscal federalism in India, evolving significantly since the establishment of the first Finance Commission. These transfers are crucial for ensuring a balanced distribution of resources across states, addressing disparities, and promoting equity. Traditionally, the criteria used for these transfers can broadly be categorised into either need based or equity based. However, as India undergoes a demographic transition, characterized by a growing elderly population, there is a pressing need to revisit these criteria.

This paper examines the evolution of fiscal transfers from central government to state governments through Finance Commission in India. Since India is going through significant demographic transition phase, there has been a major shift in India's demographic structure. As a result, share of elderly in total population has increased in the recent past and it will continue to grow in the near future as well. It is obvious that the states having higher percentage of elderly are more financially burdened as compared to the states where the share of elderly in total population is relatively low. Therefore, the states with higher percentage of dependent population need more resources than the states having lower dependent population.

The demographic transition presents unique fiscal challenges. Population aging results in lower labour force participation rate and savings rate, which has implications on the economic growth. The increasing share of the elderly in the total population necessitates higher public spending on healthcare, pensions, and social security, which disproportionately affects states with larger elderly populations (Bloom, Canning & Fink 2010). However, Nersisyan, Liu & Wray (2023) argued that the debate on all these financial challenges is misfocussed. Further, they argue that the discussion should be directed towards the challenges facing the resource provision and from the resource perspective, the burden of caring for elderly seems far less challenging.

Given the federal structure in India, Finance Commission is one of most important institution for the provisioning of resources from Central government to state governments. In spite of the need for the special resource provisioning of the elderly given the demographic transition I India, the current tax devolution formulas do not adequately account for the fiscal implications of these demographic changes. This paper argues that incorporating the share of the elderly population into the tax devolution formula can lead to a more equitable and efficient allocation of resources.

The existing literature is confined to the fiscal space required for demographic transition in terms of pensions, public expenditure design and revenue augmentation. We take this literature forward by examining the tax transfers within the intergovernmental fiscal mechanisms.

Against this backdrop, the paper sets out to analyze the evolution of intergovernmental fiscal transfers in India and proposes a revised devolution formula that includes the elderly population as a key criterion. By incorporating the share of the elderly into the devolution formula, the Finance Commission can better address the fiscal challenges posed by demographic transitions, promoting a more equitable and sustainable system of intergovernmental transfers.

The paper is organized into five sections. Section 1 analyzes the existing literature on intergovernmental fiscal mechanism in India with special reference to the Finance Commission and draws up a summary of the empirical literature. Section 2 deals with the critical analysis of the evolution of criteria of fiscal devolution in India and examines the plausibility of incorporating gender in the devolution formula. Section 3 interprets data incorporating the age pyramids across States, while section 4 presents the distribution of the divisible pool of taxes among states with and without a gender variable. This section also presents the change in the ranks of the states in terms of allocation of revenue after integrating the elderly variable. Section 5 concludes.

1. Analysing the Empirical Literature

Chakraborty (2010) noted that given the changing demographics—the monotonous decline in the child sex ratio, especially in some of the prosperous states of India—there can be no valid objection to designing Finance Commission transfers for this purpose. The study noted that while social mores cannot be changed by fiscal fiats, particularly when prejudices run deep, a proactive approach by a high constitutional body like the Finance Commission is called for, especially when the prejudices are blatantly oppressive. Indeed, such action is imperative. The intergovernmental transfer system can and should play a role in upholding the right to life for India's girl children (Chakraborty, 2016). That being said, it needs to be mentioned that it is not plausible to incorporate more gender variables in the Finance Commission's already complex transfer formula. In other words, inclusion of a "gender inequality index" in the formula may not result in the intended results, as the variables included in the index may cancel one another out. This paper works out the plausibility of integrating the sex ratio as a distance variable, however the present exercise takes a step ahead by incorporating the life cycle approach to integrate demographic transition in public finance transfers. We will revisit this point later.

Reflecting on the changes happening in Indian Fiscal Federalism, Chakraborty (2019) discussed how the issue of fiscal federalism in India has gained importance following the abolition of the Planning Commission, the creation of NITI Aayog, the introduction of the Goods and Services Tax (GST), the establishment of the GST Council, and the significant tax devolution to states recommended by the 14th Finance Commission. Chakraborty (2019) discussed how 14th Finance Commission's recommendation for a 42% tax devolution was highly praised for increasing states' fiscal resources. However, it also faced criticisms concerning the central government's fiscal space and insufficient support for local bodies. On this issue, the fourteenth finance commission chairperson clarified that the actual increase was from 39% to 42%, not 32% to 42%, and more than 50% of the grants were allocated to local bodies (Chakraborty, 2019).

The significance of conditional versus unconditional fiscal transfers was also discussed in the paper highlighting the lack of capacity to implement one-size-fits-all transfers and suggesting unconditional transfers instead. The paper also discussed the potential of making Finance Commissions permanent or abolishing them by fixing the tax devolution share through a constitutional amendment. The need for coordination and a conflict resolution mechanism between the GST Council and Finance Commissions was also emphasized. The idea of focusing on resource sharing instead of revenue sharing was also proposed.

2. Evolution of fiscal devolution formula

Since 1951, fourteen Finance Commissions (FCs) have submitted reports using various formulas for distributing central tax revenue among Indian states. These approaches can be categorized into three distinct phases. In the first phase (Table 1), from the First to the Seventh FCs, there were separate formulas for income tax and union excise duties due to constitutional provisions. During this period, population and tax collection or assessment were the primary criteria. Over time, the emphasis shifted towards factors related to economic backwardness and fiscal weakness.

Table 1: Inter se Sharing of Income Tax and Union Excise Duties

Finance Commission	Inter se sharing of income tax		Inter se sharing of Union excise duties				
	Population	Contribution	Population	Backwardness	Adjustment	Inverse of per capita income	Revenue equalisation
1 FC	80	20	100				
2 FC	90	10	90		10		
3 FC	80	20					
4 FC	80	20	80	20			
5 FC	90	10	80	20			
6 FC	90	10	75	25			
7 FC	90	10	25	25		25	25

Source: Finance Commission reports, I-VII

In the second phase (Table 2), from the Eighth to the Tenth FCs, there was a move towards unifying the formula for both income tax and union excise duties. The weight given to the population criterion was significantly reduced, while the importance of economic backwardness and fiscal weakness increased. This phase also saw the introduction of the "alternative scheme of devolution," which led to constitutional amendments.

Table 2: Inter se Sharing of Shareable Taxes from 8th FC to 10th FC

Finance Commission	Population	Inverse of per capita income	Distance of per capita	Backwardness	Area	Index of infrastructure	Tax effort
8 FC	25	25	50				
9 FC	25	12.5	50	12.5			
10 FC	20		60		5	5	10

Source: Finance Commission reports, VIII-X

The third phase (Table 3) began with the Eleventh FC and continues to the present. During this period, considerations expanded to include vertical transfers, horizontal equity, incentives for efficiency, and cost disadvantages. Key criteria introduced included income distance and fiscal discipline, among other efficiency measures. The Fourteenth FC further recognized demographic changes and introduced forest area as a new criterion.

Table 3: Inter se Sharing of Shareable Taxes from 11th FC to 14th FC

Finance Commission	Population	Inverse of per capita income	Distance of per capita	Backwardness	Area	Fiscal discipline	Demographic change	Forest area	Tax effort	Demographic performance
11 FC	10	62.5	7.5	7.5	5	7.5				
12 FC	25	50	10		7.5	7.5				
13 FC	25	47.5	10			17.5				
14 FC	17.5	50	15				10	7.5		
15 FC	15		45		15			10	2.5	12.5

Source: Finance Commission reports, X-XV

Overall, the devolution formulas have evolved to better address the varying needs of states, with a growing focus on equity and efficiency. The weight assigned to the population criterion has declined, while the significance of income distance and efficiency factors has increased. The criteria used can be broadly classified into factors reflecting needs, revenue disability measures, cost disability indicators, and fiscal efficiency indicators. This evolution reflects an ongoing effort to create a more balanced and fair system of intergovernmental fiscal transfers in India.

Once the states' share in the divisible pool is determined, the Finance Commission's task is to distribute this divisible pool among the states, which is also called horizontal devolution. Over the years, different Finance Commissions have used different criteria for the horizontal devolution. 15th Finance Commission (FC) have used three different types of criteria for the devolution purpose (need based, equity based and performance-based criteria), which we will discuss below.

2.1: Need based criteria

Population

One of the most important criteria for the devolution is population as it directly represents the need of the state; larger the population, larger is the need of the state. Keeping this view in mind, 15th Finance Commission assigned 15 per cent weightage to this criterion. We are also of the view that population should be retained as a criterion for the devolution purpose.

For calculating the inter se share of states on this criterion, Census 2011 data was used. Based on that share of each state in total population of states was calculated.

Percentage of elderly to working age population

Broadly, whole population can be divided into two groups- working age population and dependent population. Population aged between 15-59 are normally considered as working age population and children (0-14) and the elderly (60 & above) are considered as the dependent population. As data suggests, India is undergoing significant demographic transition, which will continue to be so in the decades to come. As a result of this demographic transition, the share of elderly population is going to increase significantly in the coming decades (as per Report of technical group on population projections of Census of India, 2011, the share of elderly population in total population is going to increase from 10.5 per cent in 2011 to 16.9 per cent in 2036). Moreover, the share of elderly population will increase even more for the states which have already achieved replacement level fertility. As such there will be greater need of finances in such states where the share of dependent population is getting higher. Therefore, the authors are of the view that percentage of elderly population to working age population should also be used as a criterion for the devolution purpose.

For calculating the percentage of elderly population to working age population, we utilised Census 2011 data. As mentioned above, working age population was calculated by adding up the population aged 15-59 and elderly population was calculated by adding up 60 and above population. Thereafter, elderly population as a percentage of working age population was calculated and this percentage was scaled by the 1971 population.

Area

Area is another important need-based criterion; as the geographical area of a state increases, the resource requirements of the state also increase for providing the comparable services. Therefore, it should be retained as a criterion.

Data of area of states was taken from Registrar General of India. Share of area of each state was calculated and it was adjusted for each state by applying 2 per cent floor limit for each of the state whose area was less than 2 per cent.

Forest cover

One of the greatest challenges, which human being today faces is climate change and its impact on environment. Under such circumstances, trees alleviate the impact of environmental degradation and help in maintaining ecological balances. One important point which should be kept in mind that while the benefits of the forest cover extend beyond the geographical area of the state, its cost (opportunity cost) is born itself by the state. Therefore, the states, which have maintained ecological balance by retaining/ increasing forest area should be rewarded. It is

against this backdrop that 14th Finance Commission included this as one of the criteria for the first time for devolution purpose and 15th Finance Commission retained it. We also feel that forest cover should be retained as a criterion.

Data for forest cover was obtained from Forest Survey of India, 2019. Only dense forest, which was obtained by adding moderately dense forest and very dense forest, were considered. Then share of each state was calculated from total dense forest area of all states.

2.2: Equity based criteria

Income distance

The idea behind incorporating this criterion in the devolution is to make it more equitable and progressive by providing higher devolution to states having lower per capita income and vice versa. The authors are of the opinion that progressivity should be there in the devolution and hence it should be retained as a criterion.

Comparable GSDP data from 2016-17 to 2018-19 was taken from 15th Finance Commission report and inter se share of each state on this criterion was calculated by the same method as 15th Finance Commission by taking the distance of each state from the highest income state and then scaling it from 2011 population.

2.3: Performance based criteria

Demographic performance

Up to 13th Finance Commission, all the commissions were mandated to use 1971 population for the devolution purpose. For the first time, ToR of the 14th Finance Commission mandated that the Commission might take into consideration the demographic changes which have taken since 1971. Although this is a step forward (since devolution is done in the present period, therefore it should also consider the current population), but it also penalises the states which have done well on the demographic front. This is why 15th Finance Commission incorporated total fertility rate (TFR) as one of the devolution criteria. We are also of the opinion that it should be retained as a criterion.

TFR data was also taken from 15th Finance Commission report. First of all, we took the inverse of TFR and the scaled it from 1971 population. Thereafter, inter se share of each state was calculated.

Tax effort

Tax effort was incorporated as a devolution criterion based on the views submitted to 15th Finance Commission. It was argued that it incentivises the states efficient tax collection.

For calculating tax effort, we calculated tax GSDP ratio from the 15th FC report data. This ratio was then scaled by 2011 population and the inter se share of each state was obtained.

Section 3: Population pyramid for India and States

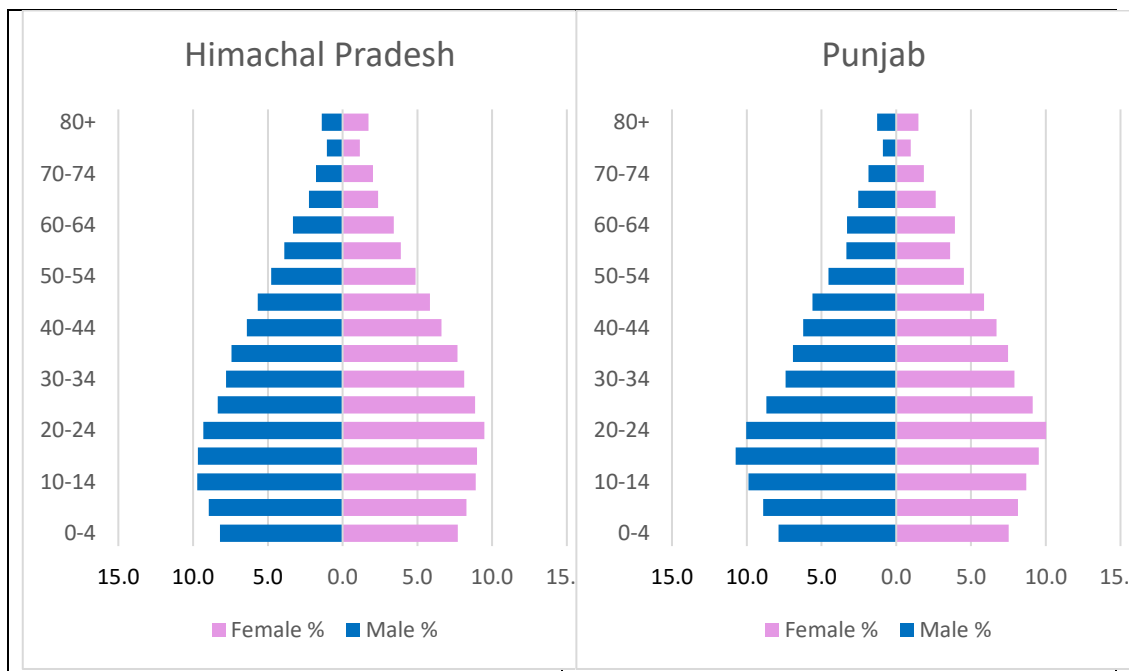
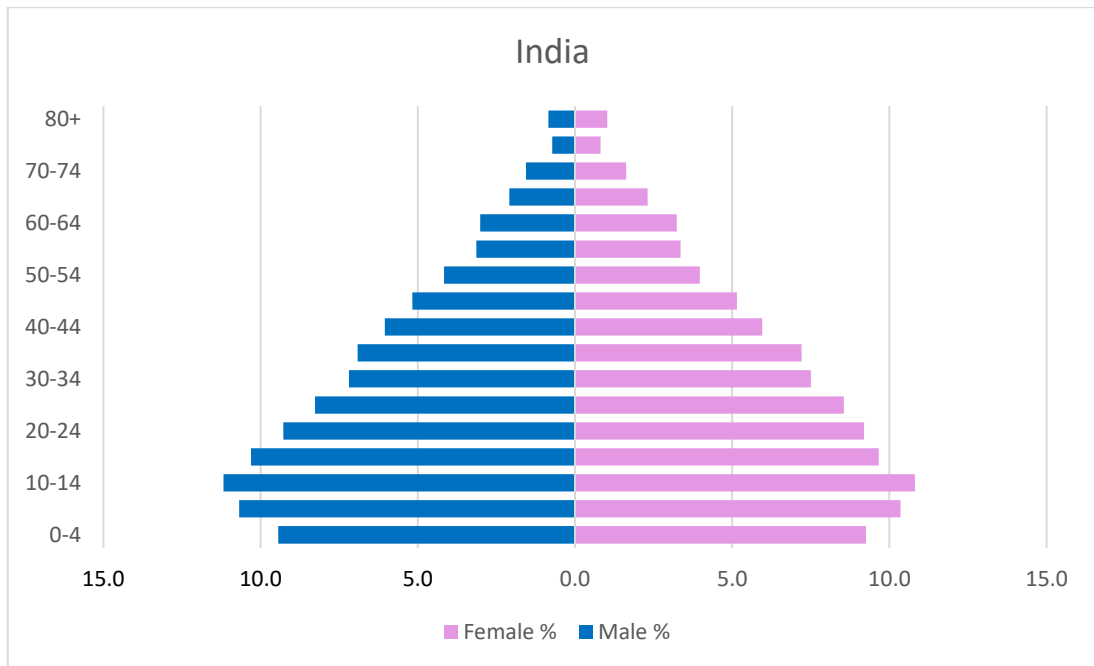
Before we delve into the issue of devolution of shareable taxes to states, it is pertinent to discuss why it is important to incorporate the elderly share in the devolution formula. For this purpose, we have shown the age-sex population pyramid for India and states in the following section.

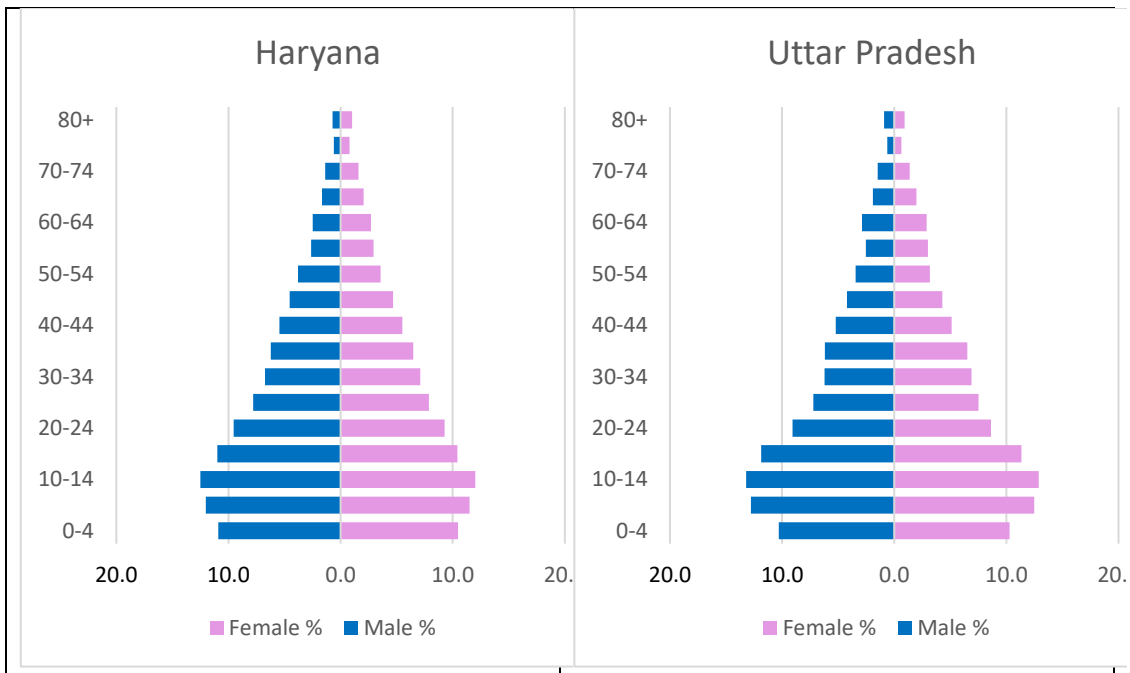
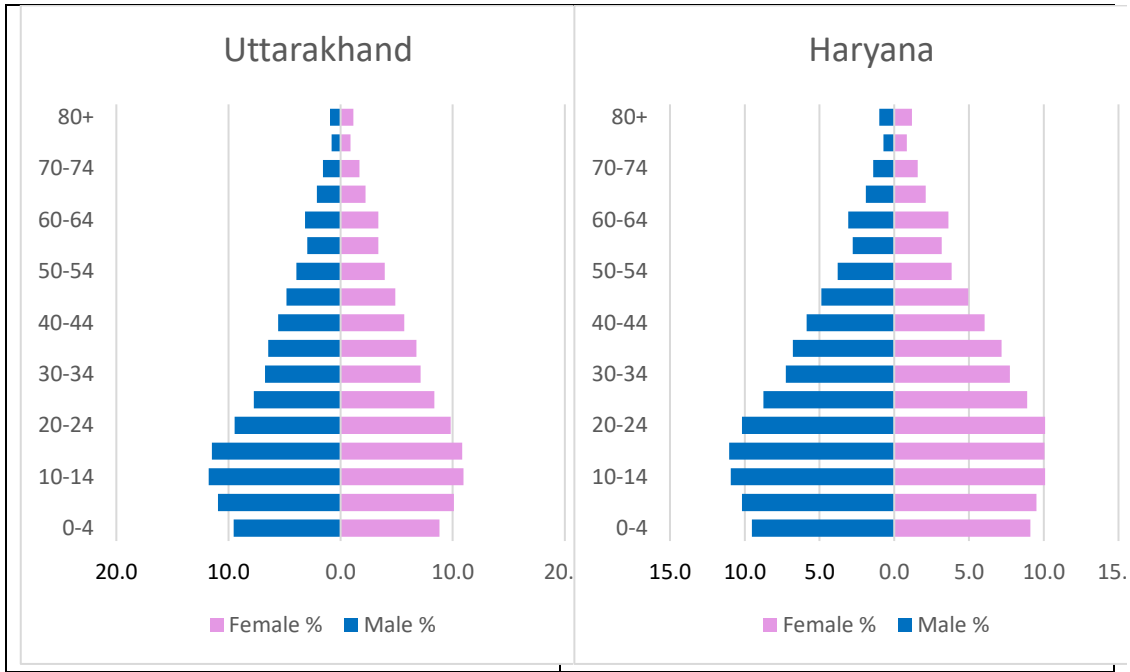
The population pyramid for India as a whole indicates a broad base, reflecting a large young population, which narrows towards the top, representing a smaller elderly population. The distribution suggests that while India has a predominantly young population, the proportion of elderly individuals is significant and growing; it is approximately 8.05% for males and 8.40% for females.

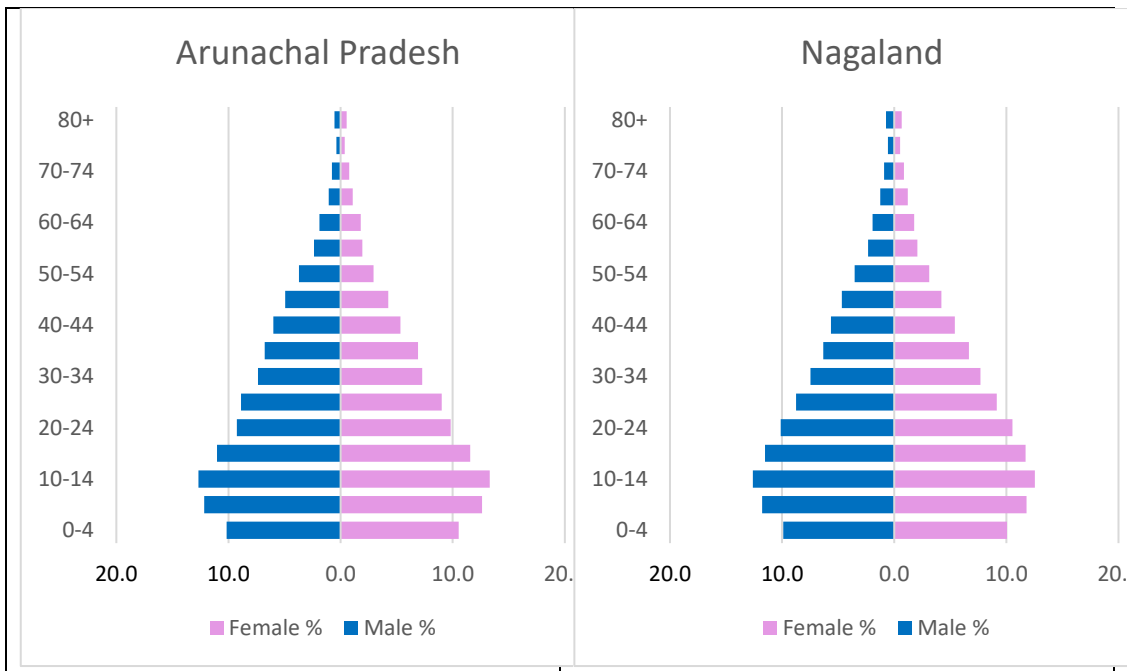
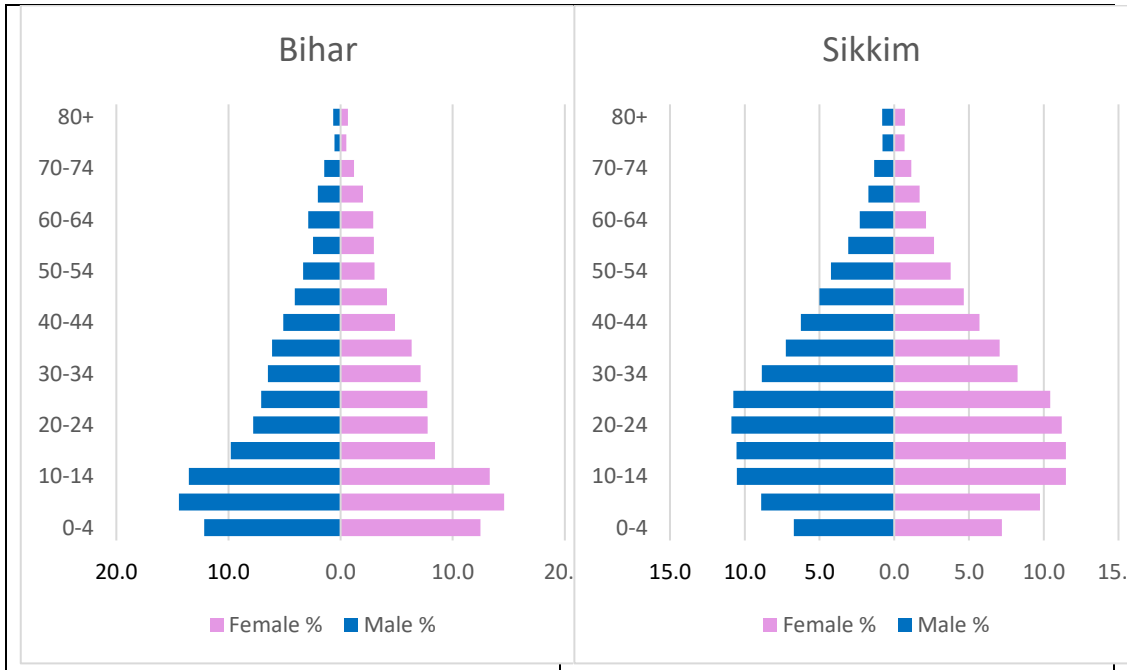
Our further perusal of the graphs reveals that Kerala, with approximately 24.15% of males and 27.53% of females aged 60 and above, exhibits a population pyramid that is broader at the top compared to other states. The other states with higher percentages of elderly populations are Goa, Tamil Nadu, Punjab and Himachal Pradesh; all these states have more than 10 per cent of the elderly population (i.e. 60 & above).

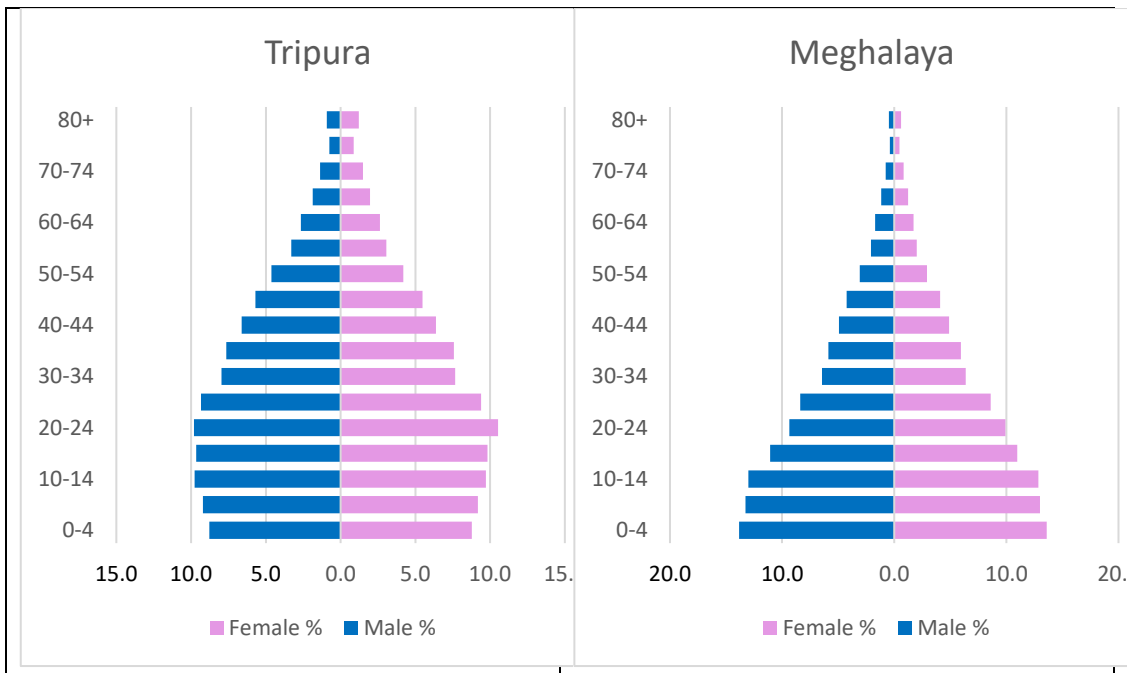
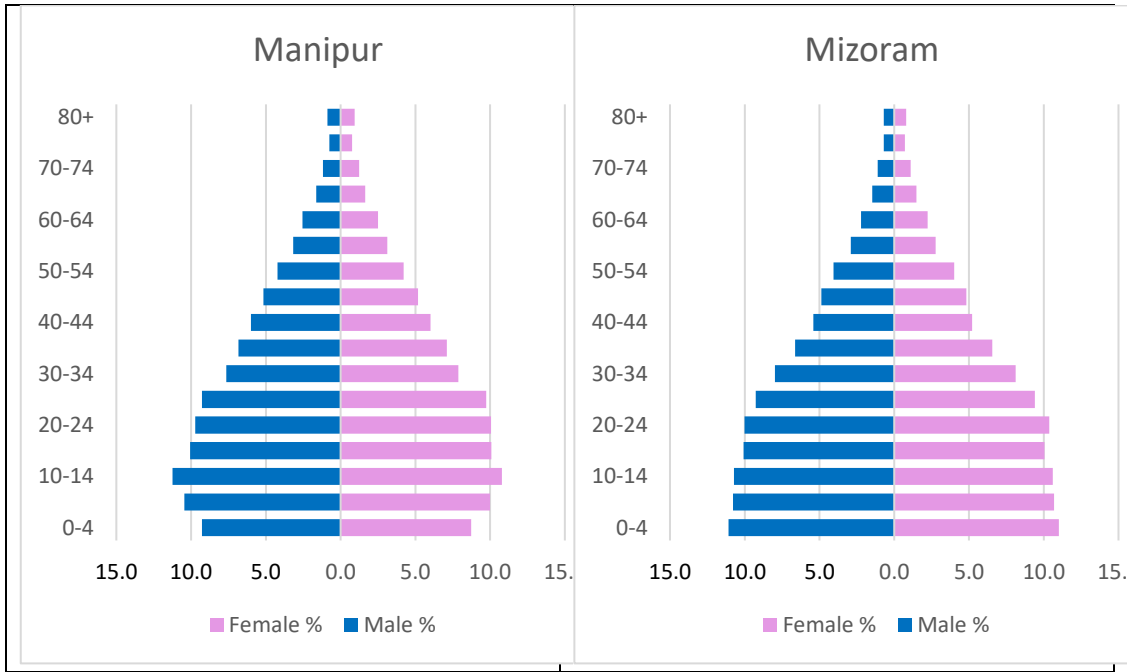
The population pyramids highlight significant demographic differences among states. States with higher percentages of elderly populations require substantial resource allocation for elderly care, including healthcare, social security, and infrastructure. Since the proportion of elderly is going to increase for all the states in the near future, therefore, it is important to take into consideration the resource requirements for the care of the elderly. Therefore, it is argued that the Finance Commission of India should consider these demographic changes for equitable and effective resource distribution.

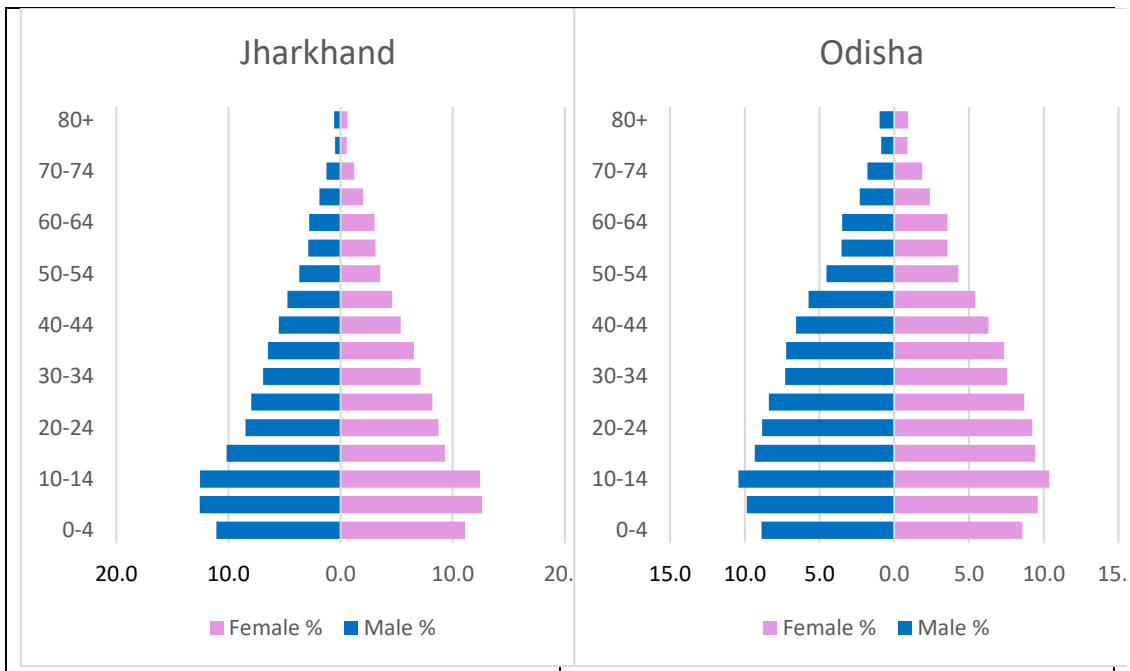
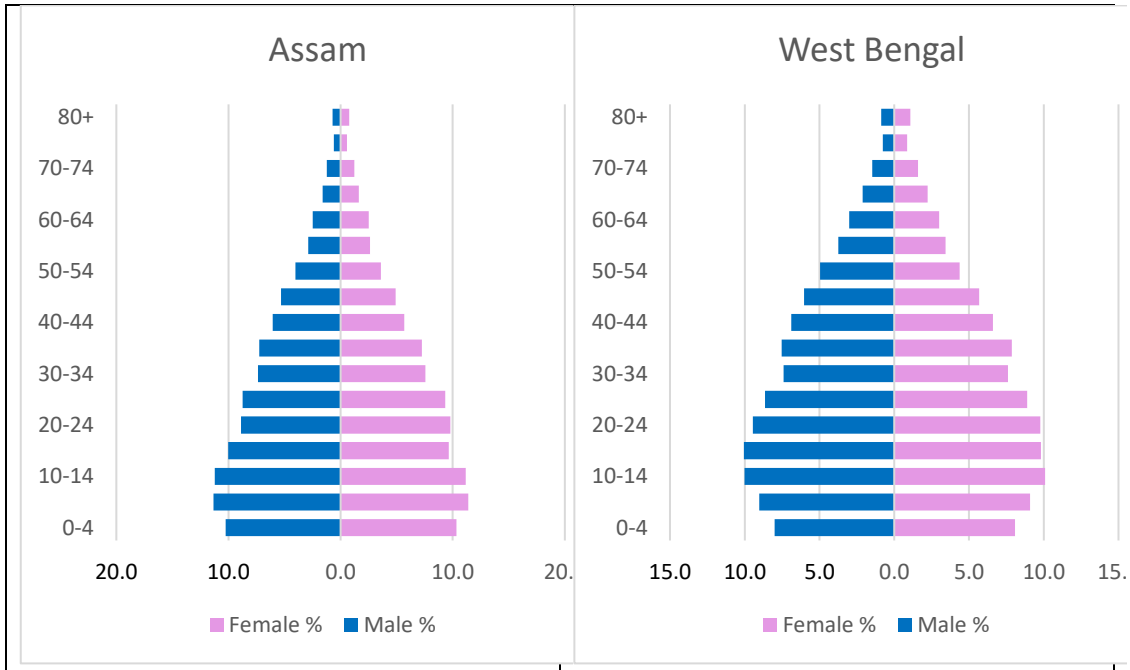
Figure 1: Gender-disaggregated Population pyramid for India and states, 2011

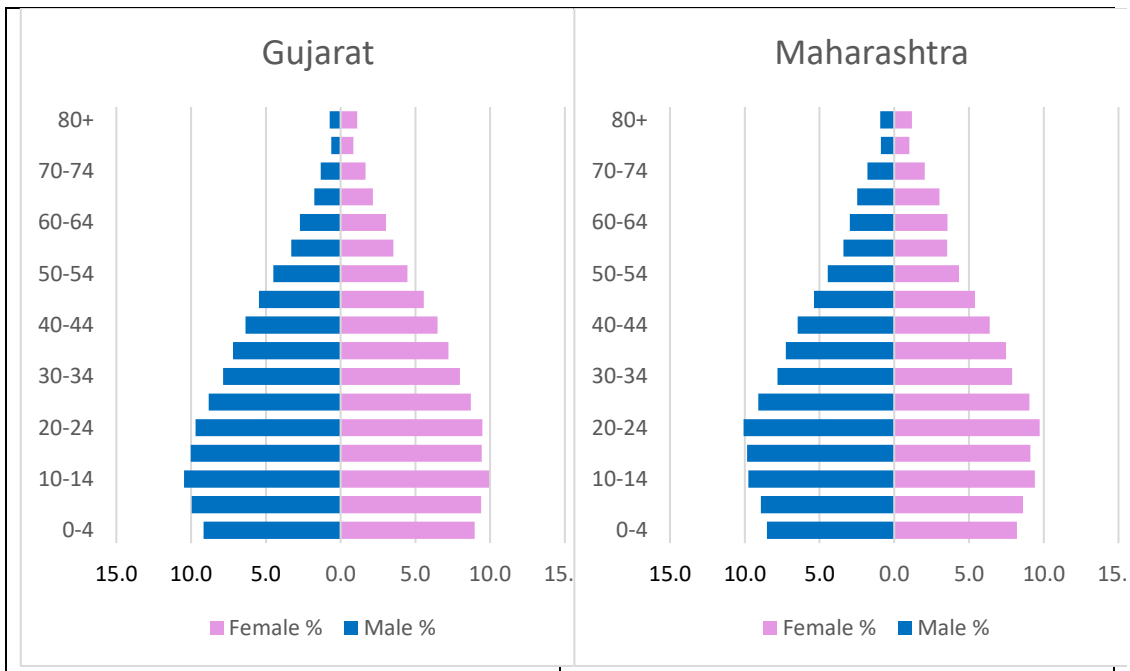
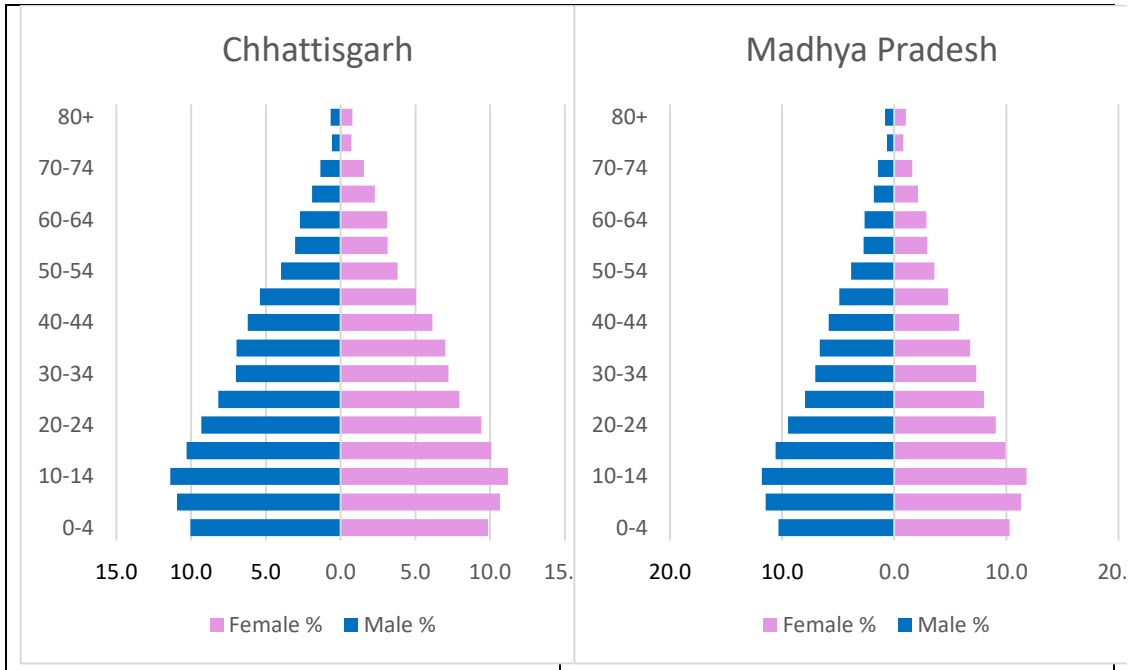


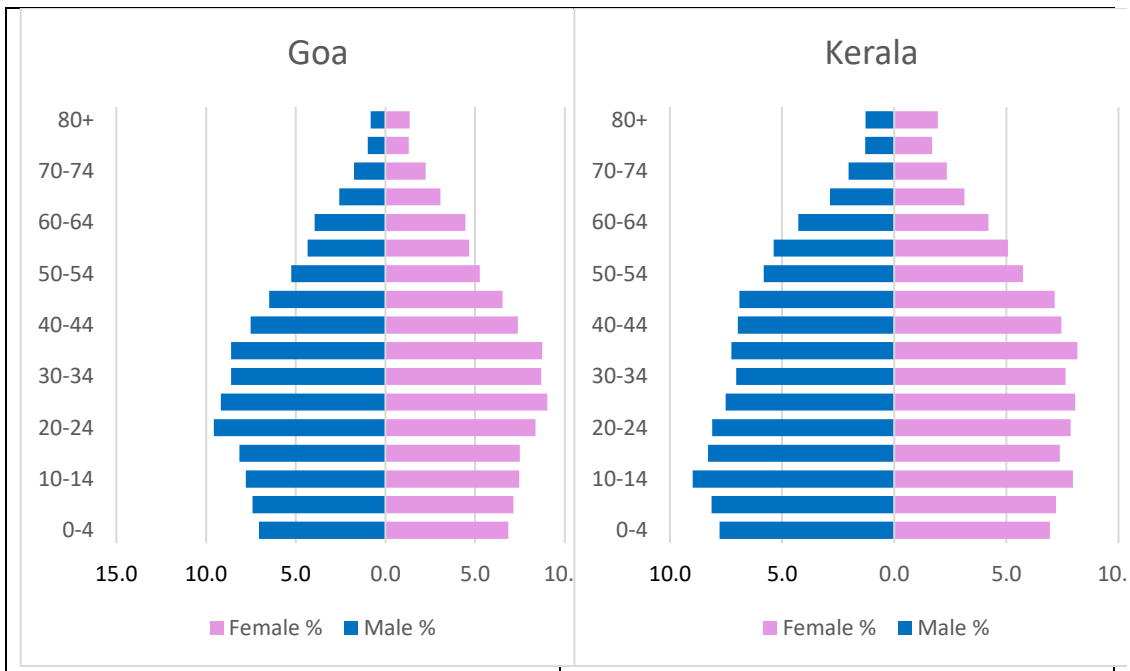
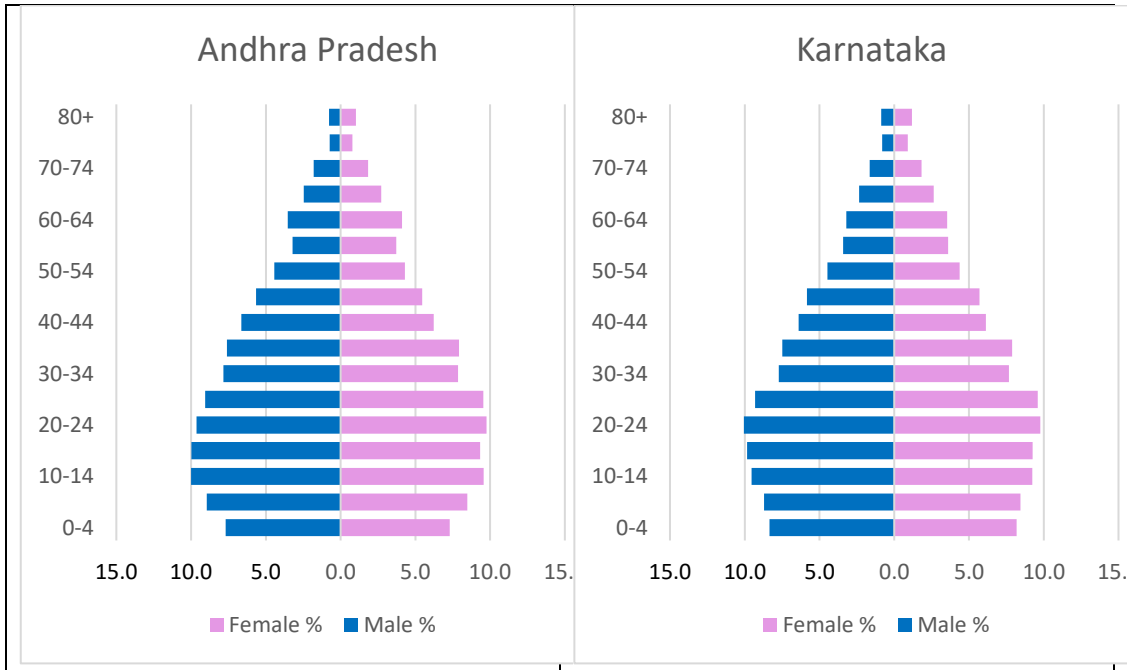


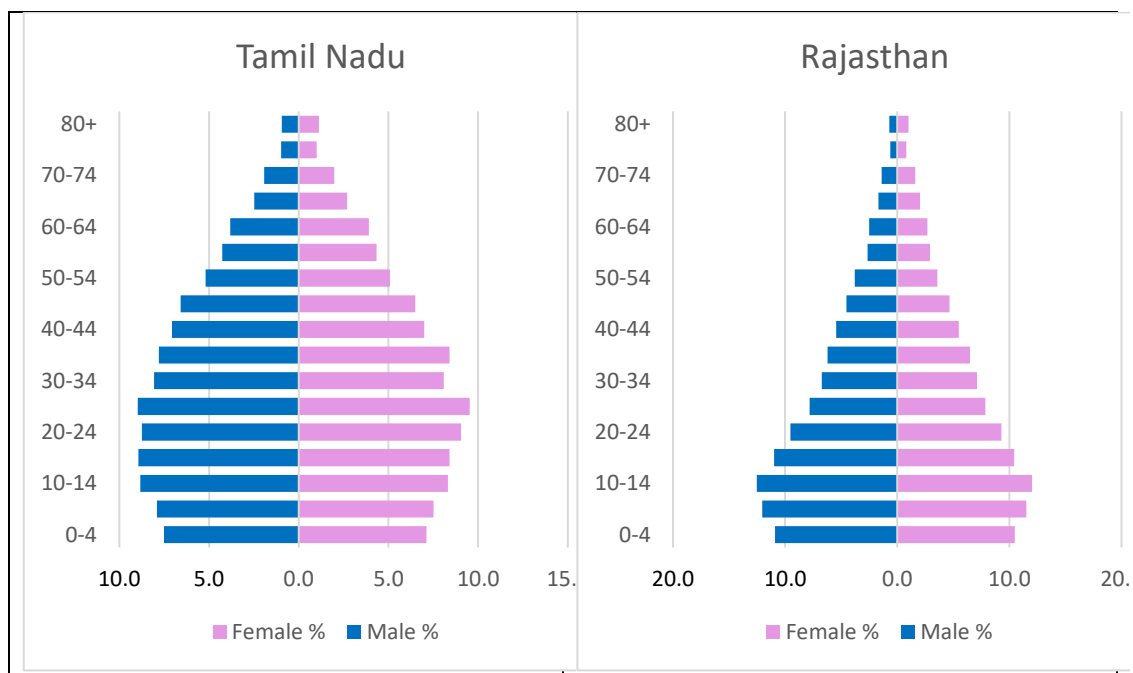












Source: Census of India, 2011

Section 4: Dynamics of Formula for Tax Transfers and Inter-State share

In this section, we have analysed the distribution of resources to states after incorporating the elderly population as a criterion in the devolution formula. *In order to construct the variable*, we have calculated elderly population as a percentage of working age population for each of the state and then scaled it with 1971 population. Table 1 outlines the various criteria and their assigned weights used to determine the share of each state in the divisible pool under different scenarios. The first scenario in the table is the criteria adopted by the 15th FC. In Scenario 1 and Scenario 2, we have tweaked the criteria of 15th FC a little by incorporating additional criterion of elderly population, which can be observed from the table. As can be observed from Table 4, in the first scenario, we have reduced the weightage of population (2011) from 15 per cent to 10 per cent and given 5 per cent weightage to our newly constructed variable of elderly population keeping the weightage to rest of the variables intact. In scenario 2, we have not assigned any weightage to 'tax effort' variable and assigned 7.5 per cent weightage to the variable of elderly population. The implications of these changes on the inter se share of states has been discussed in the section below.

Table 4: Criteria and weights (%) assigned

Criteria	15th FC criteria	Scenario 1	Scenario 2
Population	15	10	10
Area	15	15	15
Forest & ecology	10	10	10
Income distance	45	45	45
Tax & fiscal efforts	2.5	2.5	0
Demographic performance	12.5	12.5	12.5
Elderly population	0	5	7.5

Source: 15th Finance Commission Report

In both Scenario 1 and Scenario 2, there are noticeable changes in the share allocations for states compared to the original 15th FC recommendations (Table 5 & Table 6). Scenario 1 introduces a slight shift in shares for many states, with Andhra Pradesh, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu, Telangana, and Uttarakhand seeing positive gains. Conversely, states such as Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Uttar Pradesh, and West Bengal experience losses.

Scenario 2 further adjusts the allocations, with a similar but slightly different pattern. Positive gains are observed for Andhra Pradesh, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu, and Uttarakhand. However, this scenario results in negative gains for Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Telangana, Tripura, Uttar Pradesh, and West Bengal. Notably, Kerala sees the highest positive gain in both scenarios, especially in Scenario 2, while Uttar Pradesh experiences the highest loss in both scenarios.

The changes in criteria weightage between the original 15th FC recommendations and the two scenarios have significant implications. The decrease in the population weightage from 15% to 10% in both scenarios shifts focus slightly away from more populous states. The removal of tax and fiscal efforts criteria in Scenario 2 alters the incentive structure for states' fiscal performance, potentially impacting states that have been more proactive in improving their fiscal metrics. The introduction and increase of the elderly population criteria from 0% in the 15th FC to 5% in Scenario 1 and 7.5% in Scenario 2 benefits states with higher elderly populations, such as Kerala.

Table 5: Inter-se share of states with Scenario 1

State	15th FC	Scenario 1	Gain/loss from scenario 1
Andhra Pradesh	4.047	4.111	0.064
Arunachal Pradesh	1.757	1.754	-0.003
Assam	3.128	3.100	-0.028
Bihar	10.058	10.005	-0.053
Chhattisgarh	3.407	3.396	-0.011
Goa	0.386	0.389	0.003
Gujarat	3.478	3.439	-0.039
Haryana	1.093	1.077	-0.016
Himachal Pradesh	0.83	0.837	0.007
Jharkhand	3.307	3.283	-0.024
Karnataka	3.647	3.667	0.020
Kerala	1.925	2.054	0.129
Madhya Pradesh	7.85	7.801	-0.049
Maharashtra	6.317	6.345	0.028
Manipur	0.716	0.712	-0.004
Meghalaya	0.767	0.760	-0.007
Mizoram	0.5	0.498	-0.002
Nagaland	0.569	0.563	-0.006
Odisha	4.528	4.568	0.040
Punjab	1.807	1.830	0.023
Rajasthan	6.026	5.950	-0.076
Sikkim	0.388	0.387	-0.001
Tamil Nadu	4.079	4.190	0.111
Telangana	2.102	2.111	0.009
Tripura	0.708	0.705	-0.003
Uttar Pradesh	17.939	17.840	-0.099
Uttarakhand	1.118	1.118	0.000
West Bengal	7.523	7.472	-0.051

Source: 15th Finance Commission Report and Authors' Computations

These adjustments in weightage criteria demonstrate the trade-offs involved in different allocation models and their impact on the financial distributions to states. The broad pattern shows that states with higher gains generally benefit from the increased consideration for elderly populations and reduced emphasis on population size, while those with higher losses are often more populous or have higher tax efforts that are deprioritized in the revised scenarios.

Table 6: Inter-se share of states with Scenario 2

State	15th FC	Scenario 2	Gain/loss from scenario 2
Andhra Pradesh	4.047	4.140	0.093
Arunachal Pradesh	1.757	1.753	-0.004
Assam	3.128	3.101	-0.027
Bihar	10.058	10.003	-0.055
Chhattisgarh	3.407	3.385	-0.022
Goa	0.386	0.390	0.004
Gujarat	3.478	3.426	-0.052
Haryana	1.093	1.069	-0.024
Himachal Pradesh	0.83	0.843	0.013
Jharkhand	3.307	3.285	-0.022
Karnataka	3.647	3.670	0.023
Kerala	1.925	2.115	0.190
Madhya Pradesh	7.85	7.767	-0.083
Maharashtra	6.317	6.339	0.022
Manipur	0.716	0.712	-0.004
Meghalaya	0.767	0.757	-0.010
Mizoram	0.5	0.498	-0.002
Nagaland	0.569	0.563	-0.006
Odisha	4.528	4.591	0.063
Punjab	1.807	1.842	0.035
Rajasthan	6.026	5.916	-0.110
Sikkim	0.388	0.387	-0.001
Tamil Nadu	4.079	4.245	0.166
Telangana	2.102	2.100	-0.002
Tripura	0.708	0.706	-0.002
Uttar Pradesh	17.939	17.742	-0.197
Uttarakhand	1.118	1.122	0.004
West Bengal	7.523	7.493	-0.030

Source: 15th Finance Commission Report and Authors' Computations

CONCLUSION

This paper examined the evolving landscape of fiscal transfers from the central government to state governments in India, particularly in the context of the country's significant demographic shifts. The study argued how the increasing share of the elderly population imposes unique fiscal challenges on states and argues for the necessity of integrating this demographic factor into the formula-based fiscal transfers.

The analysis reveals that traditional criteria for fiscal transfers, which have historically focused on population size, economic backwardness, and fiscal weakness, are becoming increasingly inadequate. The demographic transition, characterized by an aging population, necessitates higher public spending for elderly care. Therefore, states with a higher percentage of elderly populations are disproportionately burdened, making the case for a revised devolution formula that incorporates the share of the elderly population.

Through a multi-faceted approach, the paper demonstrates the impact of integrating the elderly population into the tax devolution formula. The findings indicate that states with higher shares of elderly populations benefit significantly from this integration, promoting a more equitable distribution of resources. The proposed revisions to the devolution formula, as tested in different scenarios, show noticeable shifts in resource allocations among states.

In conclusion, the paper makes a compelling case for incorporating the elderly population into the fiscal transfer criteria used by the Finance Commission. This adjustment is essential for addressing the fiscal challenges posed by demographic transitions and ensuring a more equitable and efficient allocation of resources. By aligning fiscal policies with demographic changes, the Finance Commission can better support states in managing the financial implications of an aging population, ultimately promoting a more balanced and sustainable fiscal federalism in India.

The study also recommends that there is a need to integrate a “gender lens” within the demographic elderly transition variable to promote even more equitable and efficient allocation of resources, which is the scope for our next research paper.

References

- Anand Abhishek. & Lekha. Chakraborty. (2016). Engendering' Intergovernmental Transfers: Is There a Case for Gender-Sensitive Horizontal Fiscal Equalization?. (Working Paper 874). New York: The Levy Economics Institute of Bard College.
- Bloom, David E., David Canning, and Günther Fink. 2010. "Implications of Population Ageing for Economic Growth." *Oxford Review of Economic Policy* 26(4): 583–612
- Clements, Benedict, Kamil Dybczak, Vitor Gaspar, Sanjeev Gupta, and Mauricio Soto. 2015. "The Fiscal Consequence of Shrinking Populations." IMF Staff Discussion Note SDN/15/21, International Monetary Fund, Washington, DC.
- Chakraborty, Lekha, 2016. Asia: A Survey of Gender Budgeting Experiences. (International Monetary Fund Working Paper 16/150). Washington, DC: IMF
- Chakraborty, Lekha 2019. "[Indian Fiscal Federalism at the Crossroads: Some Reflections](#)," [Economics Working Paper Archive](#) wp_937, Levy Economics Institute.
- Chakraborty Lekha, 2010. Determining Gender Equity in Fiscal Federalism: Analytical Issues and Empirical Evidence from India; Levy Economics Institute Working Papers Series No. 590.
- Clements, Benedict, Frank Eich, and Sanjeev Gupta, eds. 2014. *Equitable and Sustainable Pensions: Challenges and Experience*. Washington, DC: International Monetary Fund.
- Dolls, Mathias, Karina Doorley, Alari Paulus, Hilmar Schneider, Sebastian Siegloch, and Eric Sommer. 2015. "Fiscal Sustainability and Demographic Change: A Micro Approach for 27 EU Countries." IZA Departmental Paper No. 9618, Institute for the Study of Labor, Bonn
- Felix, Alison, and Kate Watkins. 2013. "The Impact of an Aging U.S. Population on State Tax Revenues." Federal Reserve Bank of Kansas City. <http://www.KansasCityFed.org>.
- Feyrer, James. 2007. "Demographics and Productivity." *Review of Economics and Statistics* 89(1): 100–9.
- Frosch, Katharina. 2009. "Do Only New Brooms Sweep Clean? A Review on Workforce Age and Innovation." MPIDR Working Paper 2009-005, Max Planck Institute for Demographic Research, Rostock, Germany.

- Futagami Koichi, and Tetsuya Nakajima. 2001. "Population Aging and Economic Growth." *Journal of Macroeconomics* 23(1): 31–44.
- Giglio, Stefano, Matteo Maggiori, and Johannes Stroebe. 2015. "Very Long Run Discount Rates," *Quarterly Journal of Economics* 130(1): 1–53.
- Göbel, Christian, and Thomas Zwick. 2009. "Age and Productivity—Evidence from Linked Employer Employee Data." ZEW Discussion Paper 09-020, Center for European Economic Research, Mannheim, Germany.
- Grob, Ueli, and Stefan C. Wolter. 2007. "Demographic Change and Public Education Spending: A Conflict between Young and Old?" *Education Economics* 15(3): 277–92.
- Higgins, Matthew. 1998. "Demography, National Savings, and International Capital Flows." *International Economic Review* 39(2): 343–69.
- Howe, Neil, Richard Jackson, and Keisuke Nakashima. 2007. *The Aging of Korea: Demographics and Retirement Policy in the Land of the Morning Calm*. Global Aging Initiative, Center for Strategic and International Studies, Washington, DC.
- International Monetary Fund. 2015. "Uneven Growth: Short and Long-Term Factors." Chapter 3 in *World Economic Outlook*. Washington, DC, April.
- Krogulski, Krzysztof, Robert Sierhej, Francisco Vazquez, and Csaba Feher. 2014. "The Polish Pension System: Fiscal Impact of the 2014 Changes and Remaining Policy Challenges." Selected Issues Paper, IMF Country Report 14/174, International Monetary Fund, Washington, DC.
- Kulish, Mariano, Kathryn Smith, and Christopher Kent. 2006. "Ageing, Retirement and Savings: A General Equilibrium Analysis." Research Discussion Paper 2006-06, Reserve Bank of Australia, Sydney.
- Lee, Ronald, and Ryan Edwards. 2002. "The Fiscal Effects of Population Aging in the U.S.: Assessing the Uncertainties." In *Tax Policy and the Economy*, Vol. 16, edited by James Poterba, 141–80. Cambridge, MA: National Bureau of Economic Research. <http://www.nber.org/chapters/c10865>.
- Lee, Ronald, and Andrew Mason. 2010. "Fertility, Human Capital, and Economic Growth over the Demographic Transition." *European Journal of Population* 26(2): 159–82.