Nuclear Energy: Kahan scale and Economic Political value scale

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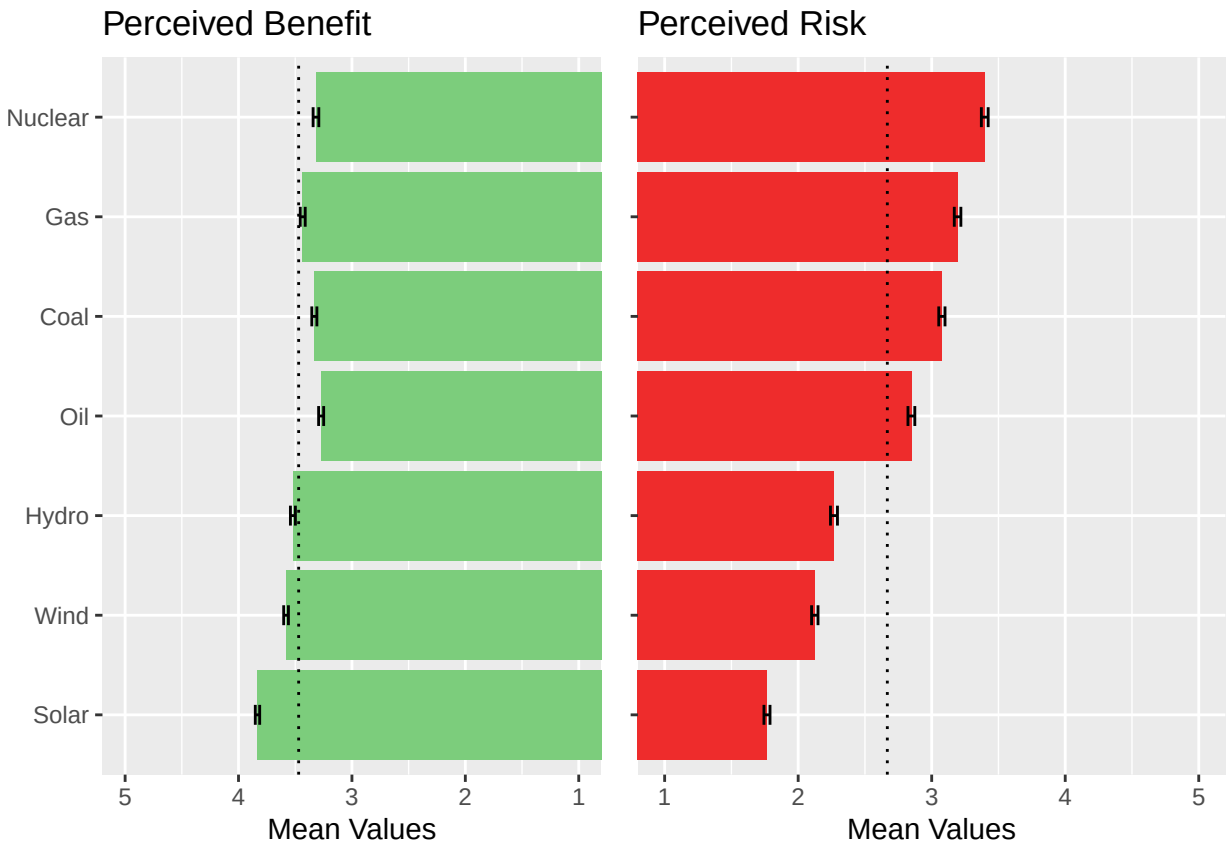
Abstract

Indian state regards nuclear energy as an important solution to rising energy needs and climate change issues. However, throughout India, nuclear power initiatives have faced opposition from people. Using survey data this study reveals that, similar to global trends, nuclear energy is perceived as highly risk in India as well. It is also perceived as the riskiest technology among all large-scale energy sources (like coal, solar, wind, oil gas, and hydro). Using risk perception theories and frameworks, this paper delves into the underlying factors influencing India's public perception of nuclear energy. While consistent demographic patterns, termed the "white male effect," influence risk perceptions in the US, demographic factors such as gender and caste have minimal influence on India's nuclear energy risk perceptions. Cultural paradigms like hierarchy versus egalitarianism and individualism versus communitarianism also show negligible impact. However, regional differences among states and economic and political values have significant impact on risk perceptions related to nuclear energy in the Indian context.

Nuclear is seen as riskier than others -this paper explore this risk perception

Mean Perceived Risk and Mean Perceived Benefit for all energy technologies.

```
##                Risky_Hydro  Risky_Solar  Risky_Wind Risky_Nuclear Risky_Coal
## Risky_Hydro     1.00000000  0.371468342  0.62273827    0.21917757 0.24754261
## Risky_Solar     0.37146834  1.000000000  0.52334549   -0.03739870 0.09826983
## Risky_Wind      0.62273827  0.523345494  1.00000000    0.10765057 0.23189555
## Risky_Nuclear   0.21917757 -0.037398704  0.10765057    1.00000000 0.31532012
## Risky_Coal      0.24754261  0.098269830  0.23189555    0.31532012 1.00000000
## Risky_Gas       0.33130183  0.064861795  0.22650038    0.37582694 0.45322323
## Risky_Oil       0.35389324  0.207588699  0.32153897    0.30402738 0.45450142
## Ben_Hydro       0.16641730 -0.271343710 -0.01717708    0.24852057 0.27072986
## Ben_Solar       0.15889085 -0.193321653  0.04530358    0.20225424 0.24538927
## Ben_Wind        0.05894831 -0.163446713 -0.01531807    0.19992592 0.28919435
## Ben_Nuclear     0.36953182  0.117098118  0.26807895    0.09168013 0.32364751
## Ben_Coal        0.24509355  0.059837799  0.20021045    0.08695121 0.28218168
## Ben_Gas         0.24849235 -0.005404625  0.14176612    0.12578275 0.29494969
## Ben_Oil         0.11687390  0.026265010  0.06073120    0.05407768 0.29348176
##                Risky_Gas Risky_Oil   Ben_Hydro   Ben_Solar    Ben_Wind
## Risky_Hydro    0.3313018 0.3538932  0.16641730  0.15889085  0.05894831
## Risky_Solar    0.0648618 0.2075887 -0.27134371 -0.19332165 -0.16344671
## Risky_Wind     0.2265004 0.3215390 -0.01717708  0.04530358 -0.01531807
## Risky_Nuclear  0.3758269 0.3040274  0.24852057  0.20225424  0.19992592
## Risky_Coal     0.4532232 0.4545014  0.27072986  0.24538927  0.28919435
## Risky_Gas      1.0000000 0.5249448  0.28095281  0.25906353  0.24279483
## Risky_Oil      0.5249448 1.0000000  0.17006275  0.19276727  0.18033585
## Ben_Hydro      0.2809528 0.1700628  1.00000000  0.59414453  0.56889850
## Ben_Solar      0.2590635 0.1927673  0.59414453  1.00000000  0.54946553
## Ben_Wind       0.2427948 0.1803358  0.56889850  0.54946553  1.00000000
## Ben_Nuclear    0.3111439 0.2870357  0.35565376  0.36659278  0.33805611
## Ben_Coal       0.3252531 0.3219312  0.32926585  0.28953359  0.35523486
## Ben_Gas        0.3616202 0.3297240  0.42021333  0.37978993  0.33439764
## Ben_Oil        0.2635186 0.2794384  0.32902048  0.25330583  0.35220580
##                Ben_Nuclear   Ben_Coal      Ben_Gas    Ben_Oil
## Risky_Hydro     0.36953182 0.24509355  0.248492347 0.11687390
## Risky_Solar     0.11709812 0.05983780 -0.005404625 0.02626501
## Risky_Wind      0.26807895 0.20021045  0.141766120 0.06073120
## Risky_Nuclear   0.09168013 0.08695121  0.125782755 0.05407768
## Risky_Coal      0.32364751 0.28218168  0.294949694 0.29348176
## Risky_Gas       0.31114387 0.32525310  0.361620203 0.26351860
## Risky_Oil       0.28703567 0.32193123  0.329724048 0.27943840
## Ben_Hydro       0.35565376 0.32926585  0.420213334 0.32902048
## Ben_Solar       0.36659278 0.28953359  0.379789932 0.25330583
## Ben_Wind        0.33805611 0.35523486  0.334397643 0.35220580
## Ben_Nuclear     1.00000000 0.49471911  0.566904473 0.43769404
## Ben_Coal        0.49471911 1.00000000  0.512842347 0.59157977
## Ben_Gas         0.56690447 0.51284235  1.000000000 0.52902059
## Ben_Oil         0.43769404 0.59157977  0.529020593 1.00000000
```


Perceived Benefit
Perceived Risk
Nuclear
Gas
Coal
Oil
Hydro
Wind
Solar
5
4
3
2
1
Mean Values
1
2
3
4
5
Mean Values

H2: Gender and Caste will have significant impact like Gender and Race in the US studies of risk.

```
##
## Call:
## lm(formula = Risky_Nuclear ~ Uppercaste + Male + Hindu + Urban +
##     age, data = alldemos)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6471 -1.1853  0.2939  0.7328  1.8294
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.35999    0.10432  32.209   <2e-16 ***
## Uppercaste   0.14139    0.06439   2.196   0.0282 *
## Male         0.13101    0.06409   2.044   0.0411 *
## Hindu       -0.12223    0.07561  -1.617   0.1062
## UrbanUrban  -0.08190    0.06283  -1.304   0.1926
## age          0.01475    0.02711   0.544   0.5866
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.184 on 1548 degrees of freedom
##   (607 observations deleted due to missingness)
## Multiple R-squared:  0.01055,    Adjusted R-squared:  0.007356
## F-statistic: 3.302 on 5 and 1548 DF,  p-value: 0.005702
```

```
##
## Call:
## lm(formula = Risky_Nuclear ~ Uppercaste + Male + Hindu + Urban +
##     age + State, data = alldemos)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.2394 -0.8825 -0.1205  0.7704  2.2064
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)          3.20856    0.09587  33.466  < 2e-16 ***
## Uppercaste          -0.11678    0.05915  -1.974  0.04854 *
## Male                 0.02336    0.05937   0.394  0.69399
## Hindu               -0.03235    0.06875  -0.471  0.63798
## UrbanUrban           0.08122    0.06376   1.274  0.20293
## age                 -0.02786    0.02519  -1.106  0.26881
## StateRajasthan       0.24549    0.09271   2.648  0.00818 **
## StateTamil Nadu     -0.23347    0.08677  -2.691  0.00721 **
## StateUttar Pradesh -0.15431    0.11865  -1.301  0.19361
## StateWest Bengal     1.31933    0.08104  16.280  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.056 on 1544 degrees of freedom
##   (607 observations deleted due to missingness)
```

```
## Multiple R-squared:  0.2147, Adjusted R-squared:  0.2102
## F-statistic: 46.91 on 9 and 1544 DF,  p-value: < 2.2e-16
```

two linear regression models

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Sat, Jan 13, 2024 - 17:42:11

Table 1: Results from 2 linear regression models

	Dependent variable:	
	Risky_Nuclear	
	(1)	(2)
Uppercaste	0.141**	−0.117**
	(0.064)	(0.059)
Male	0.131**	0.023
	(0.064)	(0.059)
Hindu	−0.122	−0.032
	(0.076)	(0.069)
UrbanUrban	−0.082	0.081
	(0.063)	(0.064)
age	0.015	−0.028
	(0.027)	(0.025)
StateRajasthan		0.245***
		(0.093)
StateTamil Nadu		−0.233***
		(0.087)
StateUttar Pradesh		−0.154
		(0.119)
StateWest Bengal		1.319***
		(0.081)
Constant	3.360***	3.209***
	(0.104)	(0.096)
Observations	1,554	1,554
R^2	0.011	0.215
Adjusted R^2	0.007	0.210
Residual Std. Error	1.184 (df = 1548)	1.056 (df = 1544)
F Statistic	3.302*** (df = 5; 1548)	46.913*** (df = 9; 1544)
Note:		*p<0.1; **p<0.05; ***p<0.01

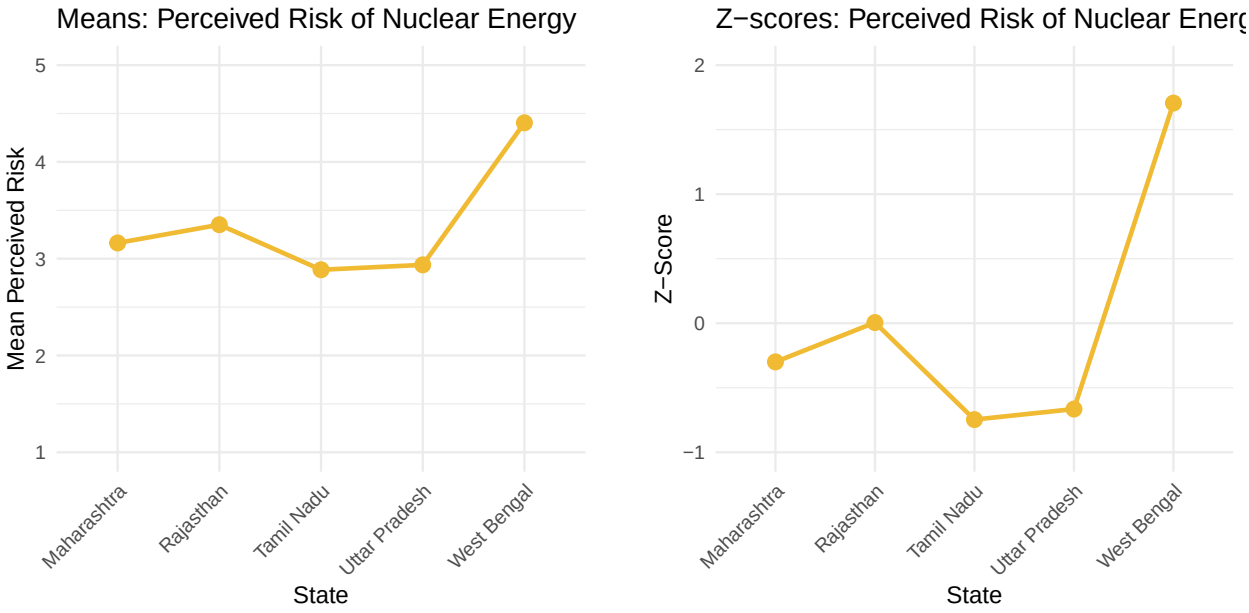
H3: Regional differences will have a strong impact

Linear regression where Mean value is the intercept

Same model with mean value as intercept.

Regional Differences Graph

Following is a graph of z scores calculated from mean perceived risk from nuclear energy by state.



Confirmatory Factor Analysis(CFA): Kahan Scale

Cronbach's Alpha on Kahan et al(2007) Scale: A Note

The Individualism items (indicated by K_I) were bringing down the Cronbach's alpha values in the Kahan scale. The Alpha for Individualism- Communitarian scale was 0.49. After removing the Individualism items (K_I) the alpha for this factor was 0.71. The reasons for this could be that the individualism items are not well adapted to the Indian population.

Table 2: Fit Measures from the CFA

Measure	Value
Comparative Fit Index (CFI)	0.954
Tucker-Lewis Index (TLI)	0.925
Root Mean Square Error of Approximation(RMSEA)	0.074
RMSEA 90 Percent confidence interval - lower	0.100
RMSEA 90 Percent confidence interval - upper	0.050

Table 3: Confirmatory Factor Analysis(CFA) on Kahan et al(2007) scale adapted to India

Scale	Items	Loadings	Standard Error	zvalue	pvalue	ci.lower	ci.upper	std.lv	std.all
Communitarian	Sometimes the government needs to make laws that keep people from hurting themselves.	0.704	0.064	11.037	0	0.5786531	0.8285358	0.7035944	0.6207523
Communitarian	The government should put limits on the choices individuals can make so they don't get in the way of what's good for society.	0.765	0.066	11.655	0	0.6366205	0.8940208	0.7653206	0.6579374
Communitarian	The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.	0.546	0.065	8.385	0	0.4184991	0.6738458	0.5461725	0.4767128
Hierarchy-Egalitarianism	We have gone too far in pushing equal rights in this country.	0.686	0.062	11.139	0	0.5656331	0.8071956	0.6864143	0.5687108
Hierarchy-Egalitarianism	We need to dramatically reduce inequalities between the rich and the poor.	-0.803	0.052	-15.402	0	-0.9054554	-0.7010198	-0.8032376	-0.7469721
Hierarchy-Egalitarianism	Our society would be better off if the distribution of wealth was more equal.	-0.640	0.061	-10.478	0	-0.7600516	-0.5205128	-0.6402822	-0.5396459
Hierarchy-Egalitarianism	We need to dramatically reduce inequalities between men and women.	-0.857	0.055	-15.539	0	-0.9650777	-0.7488861	-0.8569819	-0.7525525

Factor Analysis: New Eco-political Scale

```
## Factor Analysis using method =  minres
## Call: fa(r = ecopolall, nfactors = 2, rotate = "varimax")
## Standardized loadings (pattern matrix) based upon correlation matrix
##                  item   MR1   MR2     h2   u2 com
## HEALTHNUCLEAR      17  0.66  0.06 0.4352 0.56 1.0
## BEAUTYNUCLEAR      19  0.64  0.06 0.4104 0.59 1.0
## DISPLACENUCLEAR    15  0.59  0.18 0.3795 0.62 1.2
## POLLUTENUCLEAR     16  0.56  0.00 0.3188 0.68 1.0
## MECHANISATION       2  0.55  0.20 0.3454 0.65 1.3
## INDUSTRYSMALL       6  0.53  0.02 0.2840 0.72 1.0
## OWNERREG           14  0.53  0.10 0.2905 0.71 1.1
## ENVOVERDEV          9  0.39  0.02 0.1529 0.85 1.0
## ECONOMYGLOBAL       7 -0.34 -0.32 0.2179 0.78 2.0
## OWNERPUB           13  0.33  0.11 0.1228 0.88 1.2
## DECISIONDECEN       3  0.29  0.00 0.0840 0.92 1.0
## WEALTHLIM           1  0.27  0.27 0.1437 0.86 2.0
## OWNERPVT           11 -0.13 -0.11 0.0311 0.97 1.9
## ECONOMYLOCAL        8  0.12  0.02 0.0147 0.99 1.0
## DEVNUCLEAR         22  0.19  0.66 0.4730 0.53 1.2
## PRIDENUCLEAR       20 -0.21  0.62 0.4341 0.57 1.2
## NPRIDENUCLEAR      21 -0.19  0.61 0.4023 0.60 1.2
## PROSPERNUCLEAR     23  0.13  0.59 0.3602 0.64 1.1
## JOBSNUCLEAR        18  0.21  0.43 0.2264 0.77 1.5
## RELYNUCLEAR        24  0.06  0.39 0.1557 0.84 1.0
## INDUSTRYLARGE       5 -0.23 -0.34 0.1730 0.83 1.8
## OWNERNOREG         12 -0.11 -0.24 0.0688 0.93 1.4
## DECISIONCEN         4 -0.18 -0.22 0.0834 0.92 1.9
## DEVOVERENV         10  0.01 -0.07 0.0043 1.00 1.0
##
##                        MR1  MR2
## SS loadings           3.22 2.39
## Proportion Var        0.13 0.10
## Cumulative Var        0.13 0.23
## Proportion Explained  0.57 0.43
## Cumulative Proportion 0.57 1.00
##
## Mean item complexity =  1.3
## Test of the hypothesis that 2 factors are sufficient.
##
## df null model =  276  with the objective function =  5.93 with Chi Square =  2343.45
## df of  the model are 229  and the objective function was  2.35
##
## The root mean square of the residuals (RMSR) is  0.08
## The df corrected root mean square of the residuals is  0.08
##
## The harmonic n.obs is  405 with the empirical chi square  1307.09  with prob <  2.6e-150
## The total n.obs was  405  with Likelihood Chi Square =  924.07  with prob <  3.4e-84
##
## Tucker Lewis Index of factoring reliability =  0.593
## RMSEA index =  0.087  and the 90 % confidence intervals are  0.081 0.093
## BIC =  -450.82
## Fit based upon off diagonal values = 0.83
```

```
## Measures of factor score adequacy
##                                                    MR1  MR2
## Correlation of (regression) scores with factors   0.91 0.88
## Multiple R square of scores with factors          0.82 0.78
## Minimum correlation of possible factor scores     0.64 0.56
```

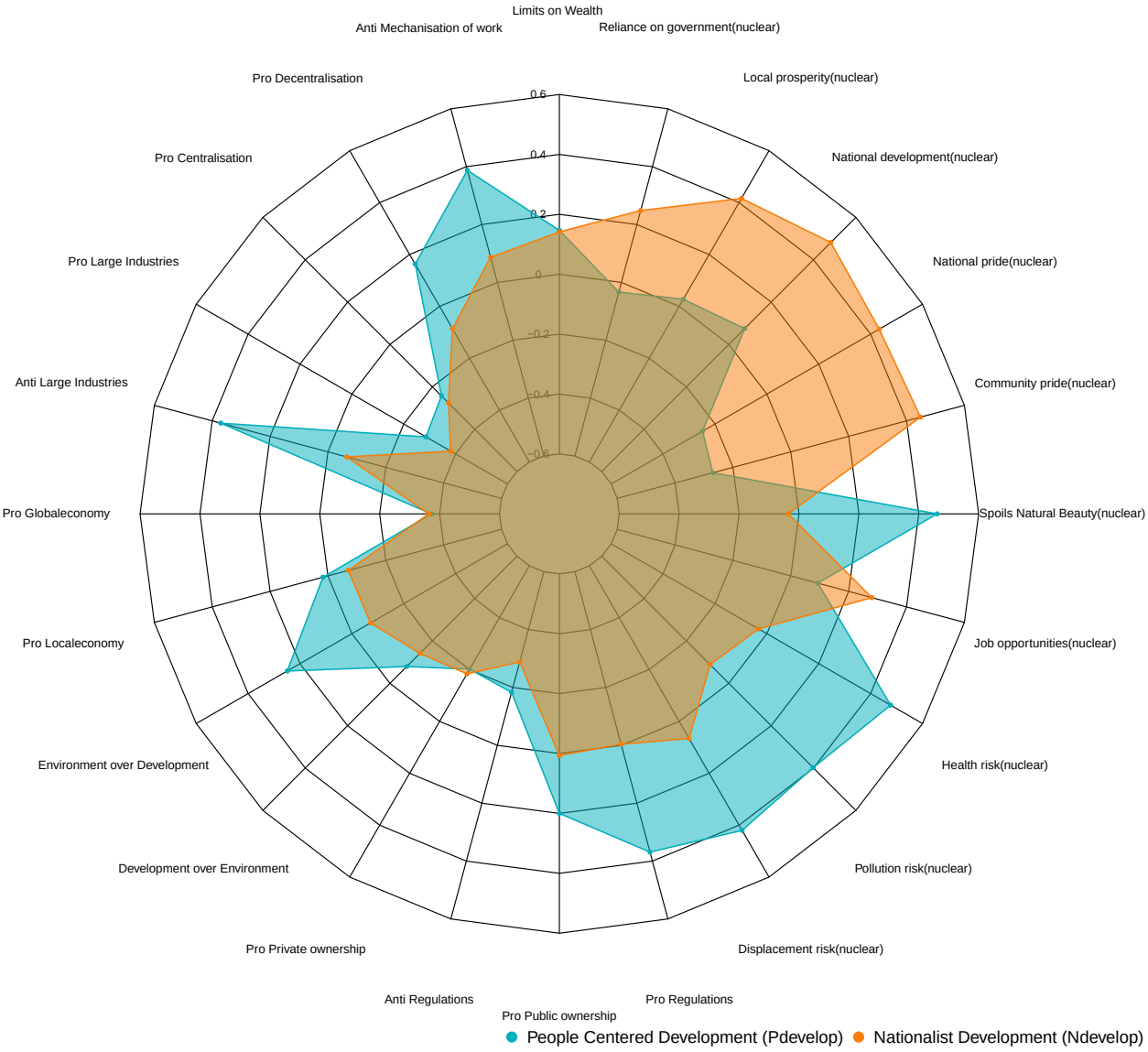


Table 4: Eco-Pol Values Factor Analysis Table

Items	PdevelopNdevelop		Communality	Uniqueness	Complexity
Health risk(nuclear)	0.657	0.062	0.435	0.565	1.018
Spoils Natural Beauty(nuclear)	0.638	0.058	0.410	0.590	1.017
Displacement risk(nuclear)	0.590	0.177	0.380	0.620	1.178
Pollution risk(nuclear)	0.565	-0.003	0.319	0.681	1.000
Anti Mechanisation of work	0.552	0.201	0.345	0.655	1.262
Anti Large Industries	0.532	0.024	0.284	0.716	1.004
Pro Regulations	0.530	0.096	0.290	0.710	1.065
Environment over Development	0.391	0.016	0.153	0.847	1.003
Pro Globaleconomy	-0.335	-0.325	0.218	0.782	1.998
Pro Public ownership	0.333	0.108	0.123	0.877	1.208
Pro Decentralisation	0.290	-0.001	0.084	0.916	1.000
Limits on Wealth	0.271	0.265	0.144	0.856	1.999
Pro Private ownership	-0.135	-0.113	0.031	0.969	1.943
Pro Localeconomy	0.120	0.018	0.015	0.985	1.043
National development(nuclear)	0.187	0.662	0.473	0.527	1.159
Community pride(nuclear)	-0.215	0.623	0.434	0.566	1.234
National pride(nuclear)	-0.189	0.605	0.402	0.598	1.193
Local prosperity(nuclear)	0.132	0.586	0.360	0.640	1.101
Job opportunities(nuclear)	0.209	0.427	0.226	0.774	1.453
Reliance on government(nuclear)	0.061	0.390	0.156	0.844	1.049
Pro Large Industries	-0.233	-0.344	0.173	0.827	1.758
Anti Regulations	-0.114	-0.236	0.069	0.931	1.440
Pro Centralisation	-0.184	-0.223	0.083	0.917	1.930
Development over Environment	0.007	-0.065	0.004	0.996	1.025

Table 5: Eigenvalues and Variance Explained for Rotated Factor Solution

Property	PdevelopNdevelop	
SS loadings	3.224	2.388
Proportion Var	0.134	0.099
Cumulative Var	0.134	0.234
Proportion Explained	0.575	0.425
Cumulative Proportion	0.575	1.000

Table 6: Two Factor Solution: Economic and Political Values Scale

Scale	Code	Items and Loadings	Alpha	Variance
People Centered Development (Pdevelop)	Health risk(nuclear)	Nuclear energy poses a great risk to the health of people living around it.(0.657)	0.757	0.13
	Spoils Natural Beauty(nuclear)	Nuclear energy spoils the natural beauty of the landscape.(0.638)		
	Anti Mechanisation of work	Rapid mechanization of work is taking away jobs from workers in this country.(0.552)		
	Anti Large Industries	Large corporations are destroying the local industries in India and benefiting only a handful of people.(0.532)		
	Displacement risk(nuclear)	Nuclear energy is leading to displacement of people from their land.(0.59)		
	Pollution risk(nuclear)	Nuclear energy increases pollution of air/water/land.(0.565)		
	Pro Regulations	Regardless of ownership, the government should pass strong regulations and implement them.(0.53)		
Nationalist Development (Ndevelop)	National development(nuclear)	Nuclear energy pushes forward the country's development.(0.662)	0.725	0.1
	Community pride(nuclear)	I would be proud if my community used nuclear energy.(0.623)		
	National pride(nuclear)	Nuclear energy is a mark of pride for our nation.(0.605)		
	Local prosperity(nuclear)	Nuclear energy brings economic prosperity to the surrounding regions.(0.586)		

all lms after FA

```
##
## Call:
## lm(formula = Risky_Nuclear ~ Uppercaste + Male + Hindu + Urban +
##     age + State + Pdevelop + Ndevelop + KahanS + KahanH, data = fascale_scores)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.58976 -0.61940  0.07404  0.57951  2.43326
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)          3.03293    0.17187  17.646  < 2e-16 ***
## Uppercaste          -0.03515    0.10549  -0.333 0.739165
## Male                -0.08457    0.11559  -0.732 0.464809
## Hindu                0.02465    0.11716   0.210 0.833464
## UrbanUrban           0.02110    0.11084   0.190 0.849126
## age                  0.03629    0.05123   0.708 0.479061
## StateRajasthan       0.18612    0.18065   1.030 0.303514
## StateTamil Nadu      1.28196    0.24030   5.335 1.62e-07 ***
## StateUttar Pradesh -0.06072    0.19273  -0.315 0.752907
## StateWest Bengal     0.96514    0.22619   4.267 2.49e-05 ***
## Pdevelop             0.15866    0.07465   2.125 0.034175 *
## Ndevelop             0.22980    0.06106   3.763 0.000193 ***
## KahanS               0.12040    0.11086   1.086 0.278127
## KahanH               0.01217    0.10249   0.119 0.905553
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9242 on 391 degrees of freedom
## Multiple R-squared:  0.2902, Adjusted R-squared:  0.2666
## F-statistic:  12.3 on 13 and 391 DF,  p-value: < 2.2e-16
```

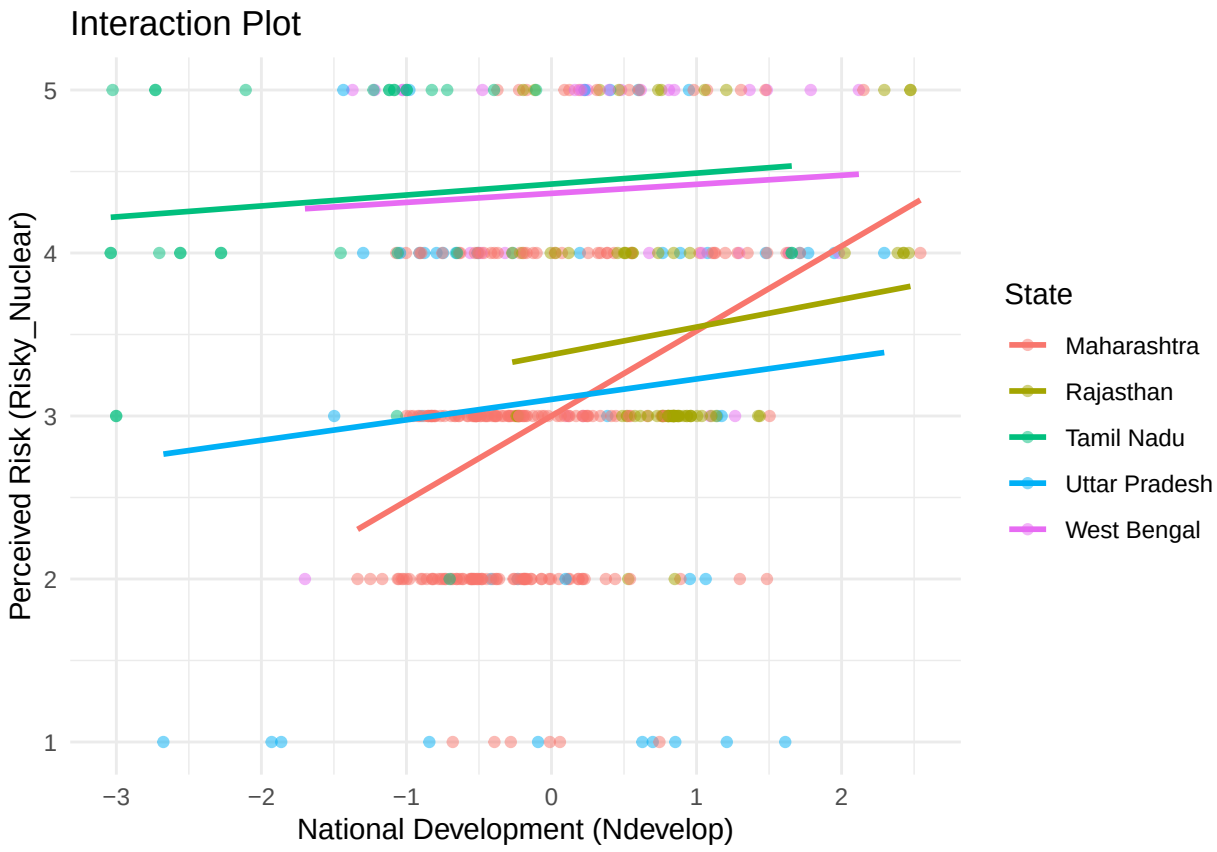
```
##
## Call:
## lm(formula = Risky_Nuclear ~ Uppercaste + Male + Hindu + Urban +
##     age + State + Pdevelop + Ndevelop, data = fascale_scores)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.64733 -0.63889  0.07378  0.59203  2.58977
##
## Coefficients:
##                     Estimate Std. Error t value Pr(>|t|)
## (Intercept)          3.01141    0.17113  17.597  < 2e-16 ***
## Uppercaste          -0.04190    0.10535  -0.398  0.69105
## Male                -0.08447    0.11542  -0.732  0.46474
## Hindu                0.02680    0.11683   0.229  0.81872
## UrbanUrban           0.03363    0.11047   0.304  0.76095
## age                  0.03792    0.05104   0.743  0.45796
## StateRajasthan       0.18645    0.18026   1.034  0.30160
## StateTamil Nadu      1.32248    0.23852   5.544 5.42e-08 ***
## StateUttar Pradesh -0.01107    0.18945  -0.058  0.95342
## StateWest Bengal     1.01748    0.22306   4.561 6.80e-06 ***
```

```
## Pdevelop            0.20730    0.06389   3.245  0.00128 **
## Ndevelop            0.25614    0.05691   4.500 8.95e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9242 on 393 degrees of freedom
## Multiple R-squared:  0.2866, Adjusted R-squared:  0.2667
## F-statistic: 14.36 on 11 and 393 DF,  p-value: < 2.2e-16
```

```
##
## Call:
## lm(formula = Risky_Nuclear ~ Uppercaste + Male + Hindu + Urban +
##     age + KahanS * State + KahanH * State + Pdevelop * State +
##     Ndevelop * State, data = fascale_scores)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.39394 -0.49320  0.02001  0.57332  2.23460
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   3.10090    0.17842  17.379  < 2e-16 ***
## Uppercaste                   -0.04657    0.10720  -0.434  0.66424
## Male                         -0.06450    0.11688  -0.552  0.58138
## Hindu                         0.02304    0.11652   0.198  0.84334
## UrbanUrban                    0.02864    0.11279   0.254  0.79970
## age                           0.01450    0.05238   0.277  0.78207
## KahanS                        0.04223    0.19242   0.219  0.82641
## StateRajasthan                0.61631    0.23849   2.584  0.01014 *
## StateTamil Nadu               1.12474    0.42483   2.648  0.00845 **
## StateUttar Pradesh           -0.08377    0.19758  -0.424  0.67183
## StateWest Bengal              0.98578    0.42377   2.326  0.02054 *
## KahanH                        0.04913    0.16019   0.307  0.75923
## Pdevelop                      0.21953    0.11834   1.855  0.06438 .
## Ndevelop                      0.52683    0.10674   4.936  1.2e-06 ***
## KahanS:StateRajasthan         1.06119    0.32928   3.223  0.00138 **
## KahanS:StateTamil Nadu       -0.02962    0.40940  -0.072  0.94236
## KahanS:StateUttar Pradesh     0.14266    0.31810   0.448  0.65407
## KahanS:StateWest Bengal      -0.13244    0.50610  -0.262  0.79370
## StateRajasthan:KahanH         0.79215    0.34928   2.268  0.02390 *
## StateTamil Nadu:KahanH       -0.11998    0.40028  -0.300  0.76454
## StateUttar Pradesh:KahanH    -0.03905    0.33379  -0.117  0.90693
## StateWest Bengal:KahanH       0.23958    0.65707   0.365  0.71560
## StateRajasthan:Pdevelop      -0.11700    0.19656  -0.595  0.55205
## StateTamil Nadu:Pdevelop     -0.13970    0.32725  -0.427  0.66971
## StateUttar Pradesh:Pdevelop  -0.15289    0.21850  -0.700  0.48452
## StateWest Bengal:Pdevelop     0.35121    0.32564   1.079  0.28149
## StateRajasthan:Ndevelop      -0.67302    0.21043  -3.198  0.00150 **
## StateTamil Nadu:Ndevelop     -0.46853    0.19958  -2.348  0.01942 *
## StateUttar Pradesh:Ndevelop  -0.40477    0.16709  -2.423  0.01589 *
## StateWest Bengal:Ndevelop    -0.46947    0.20572  -2.282  0.02305 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 0.9061 on 375 degrees of freedom
## Multiple R-squared:  0.3458, Adjusted R-squared:  0.2952
## F-statistic: 6.834 on 29 and 375 DF,  p-value: < 2.2e-16
```

```
## SIMPLE SLOPES ANALYSIS
##
## Slope of Ndevelop when State = West Bengal:
##
##   Est.   S.E.   t val.      p
## ------ ------ -------- ------
##   0.06   0.18     0.33   0.74
##
## Slope of Ndevelop when State = Uttar Pradesh:
##
##   Est.   S.E.   t val.      p
## ------ ------ -------- ------
##   0.12   0.13     0.94   0.35
##
## Slope of Ndevelop when State = Tamil Nadu:
##
##   Est.   S.E.   t val.      p
## ------ ------ -------- ------
##   0.06   0.17     0.34   0.73
##
## Slope of Ndevelop when State = Rajasthan:
##
##    Est.   S.E.   t val.      p
## ------- ------ -------- ------
##   -0.15   0.18    -0.81   0.42
##
## Slope of Ndevelop when State = Maharashtra:
##
##   Est.   S.E.   t val.      p
## ------ ------ -------- ------
##   0.53   0.11     4.94   0.00
```




```
##                GVIF Df GVIF^(1/(2*Df))
## Uppercaste 1.072628  1        1.035678
## Male       1.455901  1        1.206607
## Hindu      1.097669  1        1.047697
## Urban      1.445271  1        1.202194
## age        1.127898  1        1.062026
## State      5.433827  4        1.235629
## Pdevelop   2.635311  1        1.623364
## Ndevelop   1.763451  1        1.327950
## KahanS     4.073289  1        2.018239
## KahanH     3.967258  1        1.991798
```

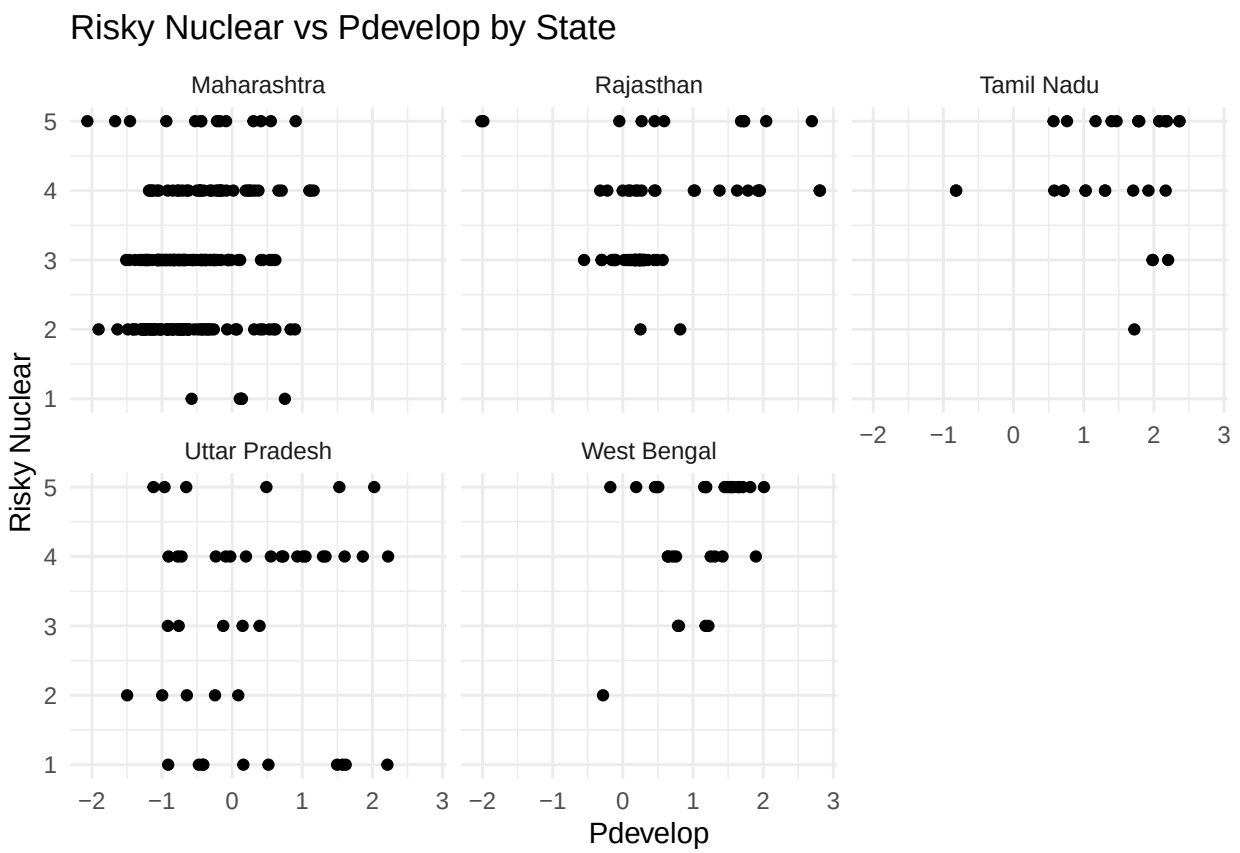
graphs for lm attempts

```
str(fascale_scores)
```

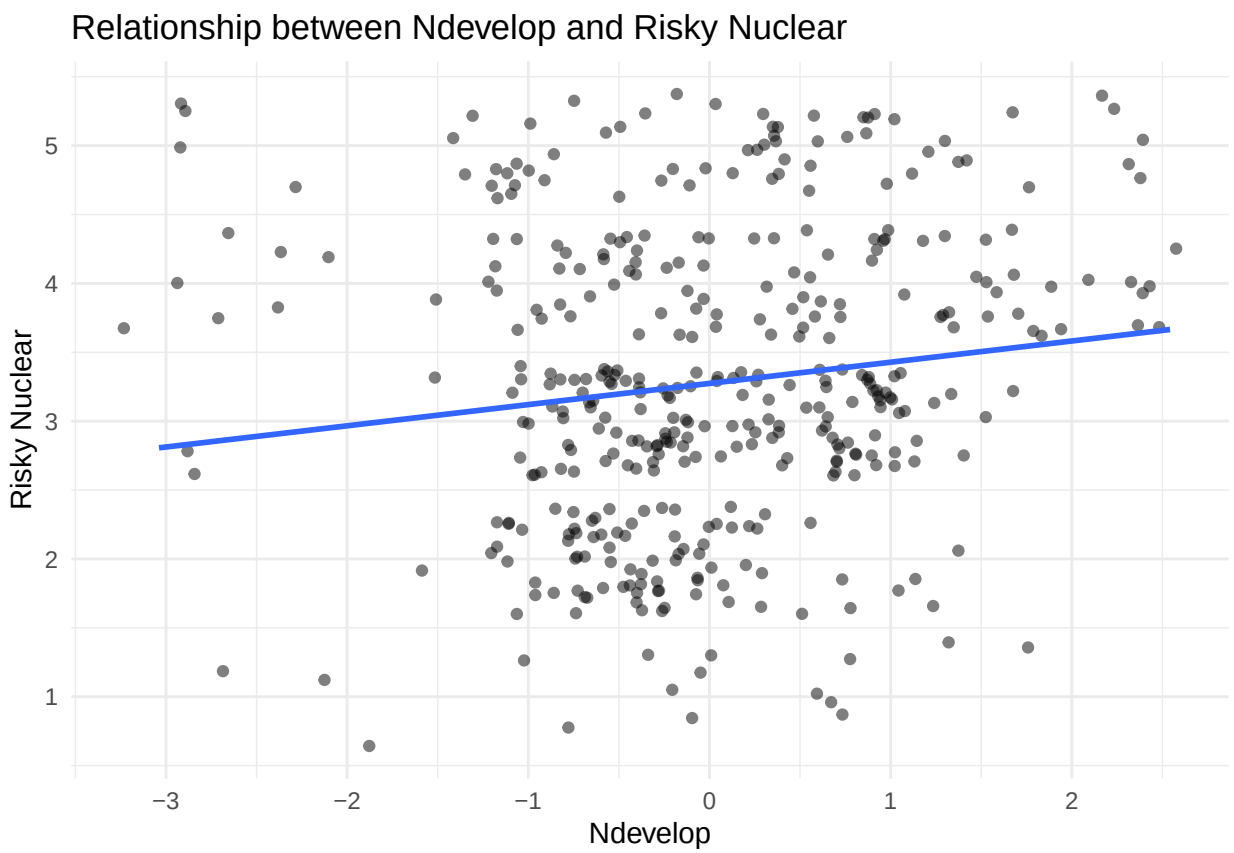
```
## 'data.frame':    405 obs. of  48 variables:
##  $ K_IINTRFER     : num  5 2 2 5 4 1 2 1 5 5 ...
##  $ K_IPRIVACY     : num  5 4 2 1 1 4 2 1 1 5 ...
##  $ K_SHARM        : num  1 5 5 5 5 2 4 5 2 5 ...
##  $ K_IPROTECT     : num  1 2 1 5 1 2 3 1 3 5 ...
##  $ K_SLIMCHOI     : num  5 5 5 5 5 5 3 1 1 5 ...
##  $ K_SPROTECT     : num  1 4 5 5 5 5 3 5 5 5 ...
##  $ K_HEQUAL       : num  1 1 1 5 2 2 5 1 4 1 ...
##  $ K_HREVDIS1     : num  1 2 1 5 1 2 2 1 4 1 ...
##  $ K_EDISCRIM     : num  5 5 4 5 5 4 5 5 3 5 ...
```

```
##  $ K_ERADEQ1      : num  5 5 5 5 5 4 4 5 4 5 ...
##  $ K_EWEALTH      : num  5 4 5 5 5 4 4 5 5 1 ...
##  $ K_ERADEQ2      : num  5 5 4 5 5 3 5 5 2 5 ...
##  $ Risky_Nuclear  : num  4 2 5 1 4 5 4 1 2 1 ...
##  $ WEALTHLIM      : num  1 2 2 5 1 5 4 5 5 5 ...
##  $ MECHANISATION  : num  5 5 5 5 5 5 4 5 2 5 ...
##  $ DECISIONDECEN  : num  5 5 4 1 5 4 2 5 3 1 ...
##  $ DECISIONCEN    : num  1 1 2 1 1 2 3 1 2 1 ...
##  $ INDUSTRYLARGE  : num  1 1 4 1 1 2 2 1 3 1 ...
##  $ INDUSTRYSMALL  : num  5 5 5 1 5 4 4 1 3 5 ...
##  $ ECONOMYGLOBAL  : num  1 2 5 2 1 1 3 1 4 4 ...
##  $ ECONOMYLOCAL   : num  1 4 1 2 1 5 4 1 4 1 ...
##  $ ENVOVERDEV     : num  1 2 5 5 1 2 5 4 3 5 ...
##  $ DEVOVERENV     : num  4 2 1 1 1 5 3 2 3 5 ...
##  $ OWNERPVT       : num  1 4 2 4 1 1 4 5 4 5 ...
##  $ OWNERNOREG     : num  1 4 2 1 2 2 3 1 4 2 ...
##  $ OWNERPUB       : num  1 2 1 5 4 4 3 5 2 5 ...
##  $ OWNERREG       : num  5 5 4 5 5 5 3 4 5 5 ...
##  $ DISPLACENUCLEAR: num  4 1 5 1 3 4 4 5 1 1 ...
##  $ POLLUTENUCLEAR : num  5 2 5 5 5 2 4 5 4 5 ...
##  $ HEALTHNUCLEAR  : num  5 1 5 5 4 5 5 5 2 5 ...
##  $ JOBSNUCLEAR    : num  4 1 5 1 4 2 3 1 4 1 ...
##  $ BEAUTYNUCLEAR  : num  5 2 5 5 3 5 4 5 3 5 ...
##  $ PRIDENUCLEAR   : num  4 1 2 5 4 2 3 1 5 1 ...
##  $ NPRIDENUCLEAR  : num  5 1 2 4 5 1 3 5 3 1 ...
##  $ DEVNUCLEAR     : num  5 1 2 4 5 4 3 5 5 1 ...
##  $ PROSPERNUCLEAR : num  5 4 4 1 5 2 3 1 5 1 ...
##  $ RELYNUCLEAR    : num  4 1 1 5 5 5 4 1 3 1 ...
##  $ Uppercaste     : num  0 0 0 0 0 0 1 0 0 0 ...
##  $ Male           : num  0 1 1 1 1 1 1 1 1 1 ...
##  $ Hindu          : num  1 1 0 1 1 1 0 1 1 1 ...
##  $ urban_rural    : chr  "Rural" "Rural" "Rural" "Rural" ...
##  $ Urban          : Factor w/ 2 levels "Rural","Urban": 1 1 1 1 1 1 1 1 1 1 ...
##  $ State          : Factor w/ 5 levels "Maharashtra",..: 4 5 5 4 4 5 5 4 4 4 ...
##  $ age            : num  3 3 4 2 2 1 5 3 3 1 ...
##  $ KahanS         : num  -0.0649 1.4437 1.5366 1.4377 1.6015 ...
##  $ KahanH         : num  -0.952 -1.228 -1.09 -0.834 -1.259 ...
##  $ Pdevelop       : num  1.045 -0.282 1.577 0.517 0.552 ...
##  $ Ndevelop       : num  1.77 -1.7 -1.219 0.627 1.95 ...
```

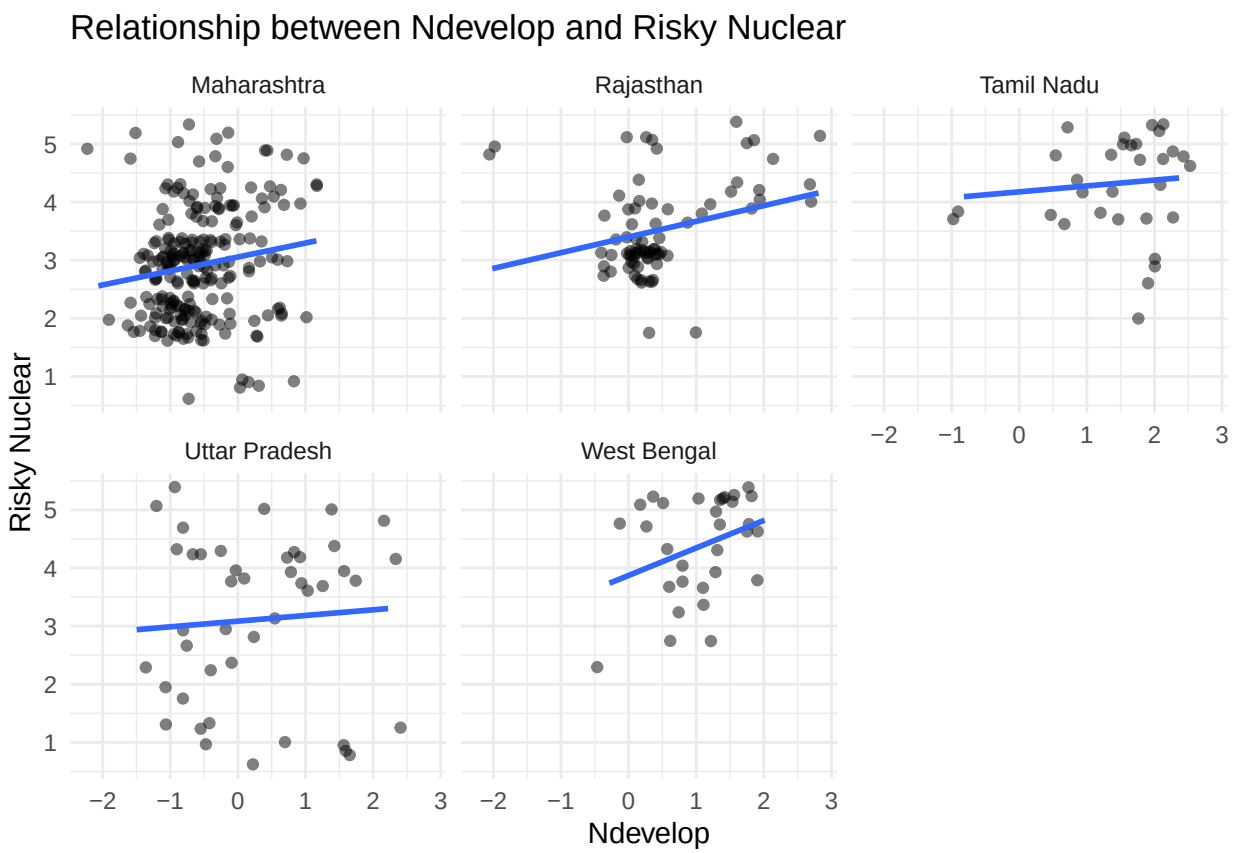
```r
ggplot(fascale_scores, aes(x = Pdevelop, y = Risky_Nuclear)) +
  geom_point() +  # or geom_line() depending on how you want to visualize it
  facet_wrap(~ State) +  # This will create separate plots for each State
  labs(title = "Risky Nuclear vs Pdevelop by State",
       x = "Pdevelop",
       y = "Risky Nuclear") +
  theme_minimal()
```



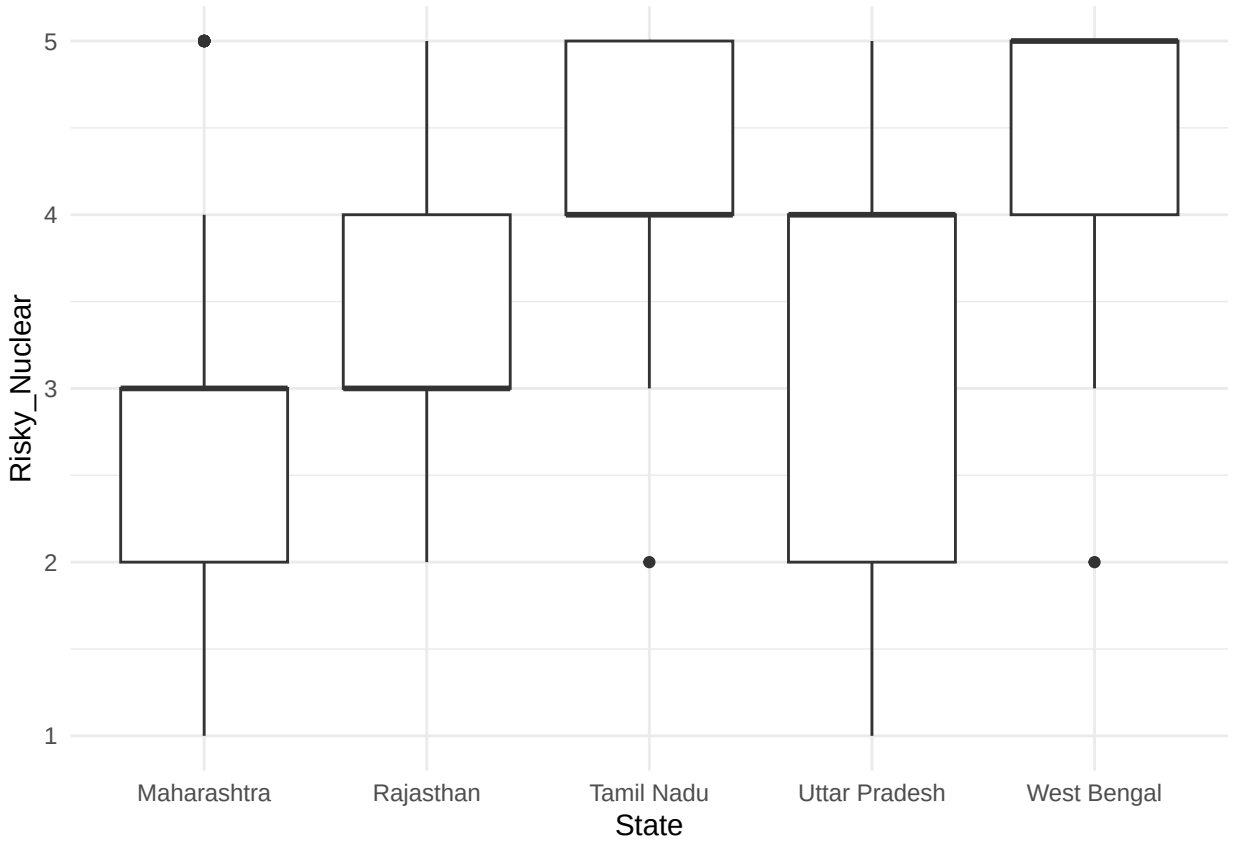

```
ggplot(fascale_scores, aes(x = Ndevelop, y = Risky_Nuclear)) +
  geom_jitter(alpha = 0.5, width = 0.2) +
  #facet_wrap(~ State) +
  geom_smooth(method = "lm", se = FALSE) +
  labs(title = "Relationship between Ndevelop and Risky Nuclear",
       x = "Ndevelop",
       y = "Risky Nuclear") +
  theme_minimal()
```




```
ggplot(fascale_scores, aes(x = Pdevelop, y = Risky_Nuclear)) +
  geom_jitter(alpha = 0.5, width = 0.2) +
  facet_wrap(~ State) +
  geom_smooth(method = "lm", se = FALSE) +
  labs(title = "Relationship between Ndevelop and Risky Nuclear",
       x = "Ndevelop",
       y = "Risky Nuclear") +
  theme_minimal()
```




```
ggplot(fascale_scores, aes(x = State, y = Risky_Nuclear)) +
  geom_boxplot() +
  #facet_wrap(~ State) +
  theme_minimal()
```


Risky_Nuclear
5
4
3
2
1
Maharashtra
Rajasthan
Tamil Nadu
Uttar Pradesh
West Bengal
State

H4 : Economic and Political Values will be important in explaining perceived risk from Nuclear Energy

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Sat, Jan 13, 2024 - 17:42:20

Table 7: Results from 2 linear regression models

	Dependent variable:	
	Risky_Nuclear	
	(1)	(2)
Uppercaste	−0.029	−0.035
	(0.107)	(0.105)
Male	−0.102	−0.085
	(0.117)	(0.116)
Hindu	−0.025	0.025
	(0.118)	(0.117)
UrbanUrban	−0.003	0.021
	(0.112)	(0.111)
age	0.050	0.036
	(0.052)	(0.051)
StateRajasthan	0.445***	0.186
	(0.169)	(0.181)
StateTamil Nadu	1.141***	1.282***
	(0.197)	(0.240)
StateUttar Pradesh	−0.006	−0.061
	(0.192)	(0.193)
StateWest Bengal	1.120***	0.965***
	(0.216)	(0.226)
Pdevelop		0.159**
		(0.075)
Ndevelop		0.230***
		(0.061)
KahanS	0.202*	0.120
	(0.110)	(0.111)
KahanH	−0.077	0.012
	(0.102)	(0.102)
Constant	3.008***	3.033***
	(0.173)	(0.172)
Observations	405	405
R^2	0.260	0.290
Adjusted R^2	0.240	0.267
Residual Std. Error	0.941 (df = 393)	0.924 (df = 391)
F Statistic	12.573*** (df = 11; 393)	12.298*** (df = 13; 391)
Note:		*p<0.1; **p<0.05; ***p<0.01

% Table created by stargazer v.5.2.3 by Marek Hlavac, Social Policy Institute. E-mail: marek.hlavac at gmail.com % Date and time: Sat, Jan 13, 2024 - 17:42:20

Table 8: Results from 2 linear regression models

	Dependent variable:	
	Risky_Nuclear	
	(1)	(2)
Uppercaste	−0.042	−0.035
	(0.105)	(0.105)
Male	−0.084	−0.085
	(0.115)	(0.116)
Hindu	0.027	0.025
	(0.117)	(0.117)
UrbanUrban	0.034	0.021
	(0.110)	(0.111)
age	0.038	0.036
	(0.051)	(0.051)
StateRajasthan	0.186	0.186
	(0.180)	(0.181)
StateTamil Nadu	1.322***	1.282***
	(0.239)	(0.240)
StateUttar Pradesh	−0.011	−0.061
	(0.189)	(0.193)
StateWest Bengal	1.017***	0.965***
	(0.223)	(0.226)
Pdevelop	0.207***	0.159**
	(0.064)	(0.075)
Ndevelop	0.256***	0.230***
	(0.057)	(0.061)
KahanS		0.120
		(0.111)
KahanH		0.012
		(0.102)
Constant	3.011***	3.033***
	(0.171)	(0.172)
Observations	405	405
R^2	0.287	0.290
Adjusted R^2	0.267	0.267
Residual Std. Error	0.924 (df = 393)	0.924 (df = 391)
F Statistic	14.356*** (df = 11; 393)	12.298*** (df = 13; 391)
Note:		*p<0.1; **p<0.05; ***p<0.01

Logistic Regression

Table 9: Odds Ratio for Perceived Risk from Nuclear Energy

	Odds Ratio	2.5 %	97.5 %	p value
Uppercaste	-0.151	-0.561	0.258	0.469
Male	-0.179	-0.627	0.267	0.432
Hindu	0.008	-0.449	0.466	0.971
UrbanUrban	0.036	-0.397	0.469	0.870
age	0.082	-0.121	0.287	0.429
KahanS	0.276	-0.188	0.738	0.243
KahanH	0.063	-0.351	0.477	0.765
Pdevelop	0.445	0.123	0.770	0.007
Ndevelop	0.447	0.186	0.712	0.001
StateRajasthan	0.164	-0.554	0.883	0.655
StateTamil Nadu	2.538	1.508	3.605	0.000
StateUttar Pradesh	-0.003	-0.834	0.822	0.994
StateWest Bengal	1.947	0.999	2.924	0.000

Appendix: Characteristics of the Sample

The following graph shows that distribution of different demographic variables in our sample of 2,160 from the combined dataset from both surveys. The percentages are rounded off to whole numbers.