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Adolescent status in India: A data analysis

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Abstract
The most commonly used chronologic definition of adolescence includes the ages of 10-18. Adolescent are being influenced by a number of factors. We have considered 24 factors to study the trend in adolescent in the states of India. Based on the factors considered, an index has been derived using principal component method. Based on the index, the states has been ranked.

Keywords: Adolescent, principal component analysis, index, ranking

1. Introduction

"Adolescence" is conventionally understood as the years between the onset of puberty and the establishment of social independence (Steinberg, 2014) [22]. The most commonly used chronologic definition of adolescence includes the ages of 10-18, but may incorporate a span of 9 to 26 years depending on the source (APA, 2002) [3]. Adolescence is a distinct phase of the developmental life cycle in humans and other animal species (Elliot & Feldman, 1990; Spear 2000) [6, 20]. Among humans, adolescence is a complex, multi- system transitional process involving progression from the immaturity and social dependency of childhood into adult life with the goal and expectation of fulfilled developmental potential, personal agency, and social accountability (Greenfield, Keller, Fuligni, &Maynard, 2003; Graber & Brookes-Gunn, 1996; Modell & Goodman, 1990; Steinberg, 2002) [13, 11, 19, 21]. Conceptualized by G. Stanley Hall, the founder of adolescent science, as a process of physical and psychosocial "rebirth", adolescence is the synthesis of profound corporal development with the evolution of a matured existential essence and integration of the nascent self within family, community, and culture (Arnett, 2002) [4]. Developmental transitions occurring during adolescence require reciprocal reorganization of the individual and the context influencing cognition, emotion, behavior and relationships (Graber & Brooks-Gunn, 1996; Lerner & Castellino, 2002) [11]. This interdependent, individual and contextual evolution presents multi-system challenges constituting the basis of risk, resiliency, and opportunity in adolescence (Geidd, 2015; Steinberg, 2014) [10, 22]. Adolescents are "simultaneously biological and cultural beings" with culture, defined as a dynamic system of shared activities and meanings (Greenfield *et al*., 2003; Swanson, *et al*., 2003) [13, 23], and biology mutually informing the process of development (Greenfield, 2002) [2]. The cultural meaning ascribed to physical maturation and the process of social redefinition during adolescence may vary significantly throughout cultural, social, and historical contexts (Steinberg, 2002; Swanson *et al*., 2003) [21, 23]. Achievement of "autonomy", generally considered an essential normative psychosocial task of adolescence, might be operationalized differently between collectivist and individualist cultures (Zimmer-Gembeck & Collins, 2003) [25]. In both western society and globally, adolescent achievement of independence and self-sufficiency is not universally prioritized over conformity to familial and cultural identity, expectations and obligations (APA, 2002; Zimmer-Gembeck & Collins, 2003) [3, 25]. The age of first marriage, closely linked to childbirth statistics, has risen globally, with substantially fewer percentages of women marrying before age 20 (Steinberg, 2014; United Nations, 2009) [22]. Formal education has been increasing across continents with a narrowing gender discrepancy between educational opportunities for girls and boys. Among developed nations globally, women now consistently outnumber men in post-secondary education, a significant trend reversal since the 1970s (National Bureau of Economic Research, 2015; Yale Global online, 2014). This combination of increasingly delayed marriage and childbirth, and prolonged education fosters a suspension of adult roles and responsibilities, or "psychosocial moratorium" as described by Margaret Mead (1961) [17] and Eric Erikson (1968) [7]. The World Health Organization (WHO) defines "adolescents" as individuals between 10 and 19 years, "youth" between 15 and 24 years, and "young people" between 10 and 24 years (WHO, 2015).

Biological, psychosocial and cognitive changes that begin during puberty and continue throughout adolescence directly affect nutritional status and nutrient needs. Adolescents experience dramatic physical growth and development during puberty, which in turn appreciably increases their requirements for energy, protein, and many vitamins and minerals. Adolescents also experience significant changes in their ability to assess and comprehend complex situations and information and in their desire to become independent, unique individuals. The increased need for energy and nutrients among adolescents, combined with increasing financial independence, increasing need for autonomy when making food choices, and immature cognitive abilities, places adolescents at nutritional risk. Therefore, it is vital that health care providers who provide nutrition education and

counseling have a thorough understanding of adolescent physical and psychosocial growth and development. The early stage of adolescence is a time of great cognitive development. At the beginning of adolescence, cognitive abilities are dominated by concrete thinking, egocentrism, and impulsive behavior. The ability to engage in abstract reasoning is not highly developed in most young teens, limiting their capacity to comprehend nutrition and health relationships. Young adolescents also lack the skills necessary to problem solve in an effort to overcome barriers to behavior change and the ability to appreciate how current behaviors can affect future health status. Middle adolescence is characterized by growth in emotional autonomy and increasing detachment from family. The bulk of physical growth and development is completed during this stage, however body image concerns may continue to be a source of trepidation, especially among males who are late to mature and females who have experienced great changes in body composition and size. Conflicts over personal choice, including food choices, become increasingly common during the stages of adolescence. Peer groups become more important than family and their influence with regard to making food choices peaks. Coinciding with the increased importance of peer acceptance, the initiation of health compromising behaviors such as smoking, alcohol consumption, using street drugs, and engaging in sexual activities often occurs during middle adolescence. Teens may consider themselves invincible and often still display impulsive behaviors. Abstract reasoning skills begin to emerge among most teens during middle adolescence, however, these skills may not be highly developed. Adolescents will often regress to concrete thinking skills when faced with overwhelming emotions or stressful situations. Teens start to comprehend the relationship between existing health behaviors and future health status but their desire to fit in with peers may make it difficult for adolescents to make health related choices based upon knowledge rather than peer pressure. The late stage of adolescence is characterized by the development of a strong personal identity. Biological growth and development has concluded among most teens and body image issues are less common. Older adolescents are able to manage increasingly sophisticated social situations, are able to suppress impulsive behaviors, and are less affected by peer pressure. Economic and emotional dependence upon family is markedly decreased and conflict over personal issues decrease. Relationships with a single individual become more influential than those with a group of peers as a stronger sense of personal identity emerges. The expansion of abstract reasoning skills continues to occur during late adolescence, which assists teens in developing an ability to comprehend how current health behaviors affect long-term health status. This is an especially important skill for adolescent females who plan to have children or who become pregnant during late adolescence. Older teens are now capable of learning problem solving skills that can assist them in overcoming barriers to behavior change.

2. Data

The variables affecting adolescent considered are reproductive and sexual health; nutritional health – anemia, PEM & PCM, BMI, obesity; mental health; accidental and intentional violence; substance abuse; challenge in parenting; developing own belief systems; independence with development of social skill, etc. In this communication, the following variables are being considered – age specific fertility rate 15-19 years of age as per NFHS III(X_{01}); total fertility rate 15-49 years of age as per NFHS III(X_{02}); crude birth rate as per NFHS III(X_{03}); age at first marriage for women as per NFHS III(X_{04}); age at first marriage for men as per NFHS III(X_{05}); mild anemia for women as per NFHS III(X_{06}); moderate anemia for women as per NFHS III(X_{07}); severe anemia for women as per NFHS III(X_{08}); any anemia for women as per NFHS III(X_{09}); mild anemia for men as per NFHS III(X_{10}); moderate anemia for men as per NFHS III(X_{11}); severe anemia for men as per NFHS III(X_{12}); any anemia for men as per NFHS III(X_{13}); percentage of women aged 15-49 years who use tobacco as per NFHS III(X_{14}); percentage of women aged 15-49 years who use cigri/biri as per NFHS III(X_{15}); percentage of women aged 15-49 years who use alcohol as per NFHS III(X_{16}); percentage of men aged 15-49 years who use tobacco as per NFHS III(X_{17}); percentage of men aged 15-49 years who use cigri/biri as per NFHS III(X_{18}); percentage of men aged 15-49 years who use alcohol as per NFHS III(X_{19}); total adolescent as per census 2011; total rural adolescent as per census 2011(X_{20}); total urban adolescent as per census 2011(X_{21}); total literate adolescent as per census 2011(X_{22}); total illiterate adolescent as per census 2011(X_{23}); total adolescent who are main workers as per census 2011(X_{24}).

3. Analysis

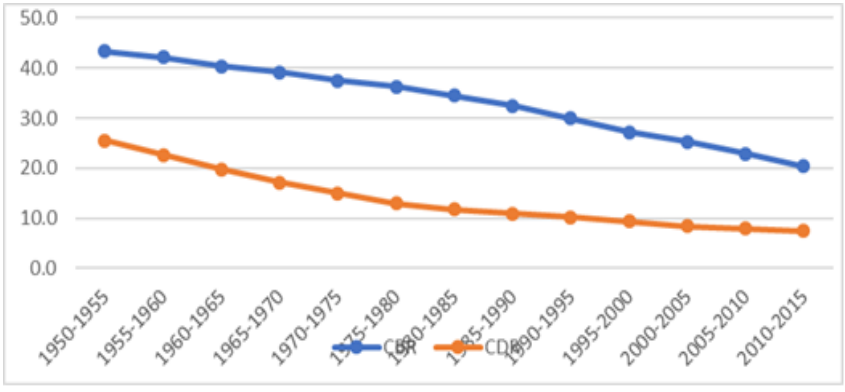

Fig 1: showing Crude Birth Rate (CBR), Crude Death Rate (CDR) and Total Fertility Rate (TFR) for India during since 1950

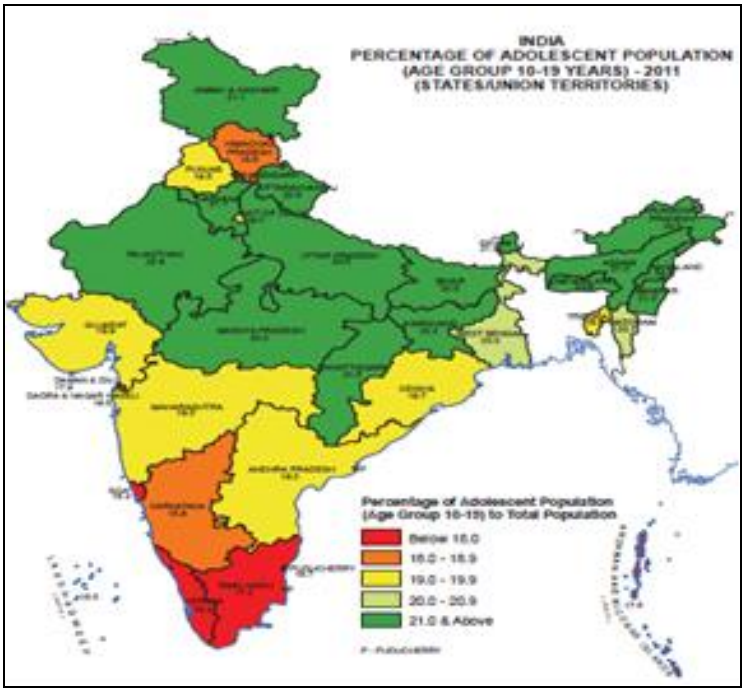

Fig 2: showing percent of Adolescent population 2011- Statewise

Table 1: showing percentages of adolescent in the states of India 2011

State	Female	Male	Total
India	47.32	52.68	41.83
Andaman & Nicobar Islands	48.29	51.71	34.94
Andhra Pradesh	48.42	51.58	38.53
Arunachal Pradesh	49.57	50.43	48.47
Assam	48.40	51.60	42.05
Bihar	46.08	53.92	44.94
Chandigarh	43.07	56.93	37.50
Chhattisgarh	49.29	50.71	42.93
Dadra & Nagar Haveli	43.67	56.33	39.63
Daman & Diu	36.89	63.11	35.88
Goa	47.75	52.25	30.83
Gujarat	46.48	53.52	39.76
Haryana	44.60	55.40	42.18
Himachal Pradesh	47.26	52.74	37.28
Jammu & Kashmir	47.75	52.25	42.28
Jharkhand	47.64	52.36	44.32
Karnataka	48.14	51.86	37.86
Kerala	49.07	50.93	32.53
Lakshadweep	51.28	48.72	36.05
Madhya Pradesh	47.42	52.58	44.09
Maharashtra	46.76	53.24	38.02
Manipur	49.13	50.87	42.07
Meghalaya	49.47	50.53	47.78
Mizoram	49.22	50.78	41.44
Nagaland	48.31	51.69	48.35
Nct Of Delhi	45.09	54.91	39.50
Odisha	49.53	50.47	39.42
Puducherry	48.97	51.03	33.34
Punjab	44.16	55.84	38.94
Rajasthan	46.98	53.02	45.79
Sikkim	49.23	50.77	43.85
Tamil Nadu	48.37	51.63	34.46
Tripura	49.11	50.89	38.95
Uttar Pradesh	46.87	53.13	48.96
Uttarakhand	47.49	52.51	45.00
West Bengal	48.50	51.50	39.91

The percentage of adolescent in India is 47.32 (female) and 52.68 (male). It is 41.83% in total population. Among 29 states, percentage of adolescent for female is minimum for Daman & Diu and maximum for Lakshadweep; for male is minimum for Lakshadweep and maximum for Daman & Diu; for total is minimum for Goa and maximum for Uttar Pradesh. Rural adolescent is minimum in Chandigarh and maximum in Himachal Pradesh. Literate adolescent is minimum in Bihar and maximum in Kerala. Main worker adolescent is minimum in Lakshadweep and maximum in Daman & Diu. In West Bengal, there are 7.61 are main workers, 36.01% are rural inhabitant and 91.24% are literate. Among female adolescent, there are 35.74% are rural inhabitant but 88.17% are literate with 5.17% are main workers. Rural female adolescent is minimum in Chandigarh and maximum in Himachal Pradesh. Literate female adolescent is minimum in Bihar and maximum in Kerala. Main worker female adolescent is minimum in Lakshadweep and maximum in Andhra Pradesh.

Age-specific fertility in age 15-19 years is minimum in Goa and maximum in Bihar. X_{02} is minimum in Karnataka and maximum in Uttar Pradesh. X_{03} is minimum in Meghalaya and maximum in Uttar Pradesh. X_{04} is minimum in Karnataka and maximum in Uttar Pradesh. X_{05} is minimum in Mizoram and maximum in Rajasthan. X_{06} is minimum in Kerala and maximum in Uttar Pradesh. X_{07} is minimum in Kerala and maximum in Assam. X_{08} is minimum in Kerala and maximum in Assam. X_{09} is minimum in Kerala and maximum in Assam. X_{10} is minimum in Kerala and maximum in Uttar Pradesh. X_{11} is minimum in Kerala and maximum in Himachal Pradesh. X_{12} is minimum in Kerala and maximum in Assam. X_{13} is minimum in Kerala and maximum in Assam. X_{14} is minimum in Arunachal Pradesh and maximum in Punjab. X_{15} is minimum in Meghalaya and maximum in Punjab. X_{16} is minimum in Goa and maximum in Uttaranchal. X_{17} is minimum in Karnataka and maximum in Punjab. X_{18} is minimum in Karnataka and maximum in

Punjab. X_{19} is minimum in Goa and maximum in Uttaranchal. X_{20} is minimum in Madhya Pradesh and maximum in Tripura. X_{21} is minimum in Madhya Pradesh and maximum in Tripura. X_{22} is minimum in Orissa and maximum in West Bengal. X_{23} is minimum in Orissa and maximum in West Bengal. X_{24} is minimum in Orissa and maximum in West Bengal. X_{25} is minimum in Orissa and maximum in West Bengal. X_{26} is minimum in Orissa and maximum in West Bengal. X_{27} is minimum in Orissa and maximum in West Bengal.

Table 2: showing the 13 standardized variables

State	X_{01}	X_{02}	X_{03}	X_{04}	X_{05}	X_{06}	X_{07}	X_{08}	X_{09}	X_{10}	X_{11}	X_{12}	X_{13}
Andhra Pradesh	0.71	0.00	0.04	0.86	0.57	0.77	0.97	0.97	0.91	0.61	0.47	0.62	0.59
Arunachal Pradesh	0.44	0.56	0.48	0.58	0.52	0.72	0.59	0.47	0.73	0.70	0.64	0.41	0.71
Assam	0.59	0.29	0.36	0.51	0.24	0.89	1.00	1.00	1.00	0.96	0.88	1.00	1.00
Bihar	1.00	1.00	1.00	1.00	0.74	1.00	0.75	0.29	0.97	1.00	0.65	0.48	0.87
Chhattisgarh	0.65	0.38	0.39	0.75	0.80	0.79	0.74	0.56	0.83	0.73	0.56	0.38	0.68
Delhi	0.15	0.15	0.11	0.23	0.28	0.70	0.42	0.06	0.64	0.53	0.33	0.14	0.45
Goa	0.00	0.00	0.02	0.00	0.07	0.59	0.37	0.18	0.55	0.31	0.17	0.28	0.26
Gujarat	0.44	0.29	0.33	0.46	0.53	0.72	0.78	0.76	0.80	0.61	0.45	0.34	0.56
Haryana	0.46	0.41	0.36	0.57	0.54	0.74	0.79	0.50	0.81	0.65	0.29	0.17	0.48
Himachal Pradesh	0.02	0.07	0.12	0.06	0.17	0.63	0.50	0.35	0.62	0.54	0.40	0.07	0.48
Jharkhand	0.94	0.69	0.65	0.93	0.82	0.98	0.88	0.38	1.00	0.94	0.87	0.10	0.92
Jammu Kashmir	0.07	0.27	0.28	0.09	0.26	0.74	0.62	0.47	0.75	0.59	0.31	0.48	0.49
Karnataka	0.59	0.13	0.20	0.57	0.21	0.68	0.71	0.59	0.74	0.48	0.37	0.66	0.48
Kerala	0.10	0.06	0.00	0.11	0.00	0.51	0.31	0.15	0.47	0.19	0.18	0.14	0.20
Maharashtra	0.57	0.14	0.15	0.55	0.23	0.65	0.66	0.50	0.70	0.51	0.29	0.28	0.42
Manipur	0.18	0.47	0.54	0.05	0.21	0.60	0.24	0.15	0.51	0.35	0.21	0.14	0.29
Meghalaya	0.28	0.91	0.77	0.24	0.41	0.65	0.59	0.53	0.68	0.80	1.00	0.24	0.93
Mizoram	0.48	0.48	0.53	0.15	0.45	0.58	0.42	0.21	0.56	0.51	0.44	0.10	0.49
Madhya Pradesh	0.69	0.60	0.53	0.79	0.82	0.81	0.67	0.29	0.81	0.77	0.47	0.38	0.65
Nagaland	0.34	0.88	0.76	0.21	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orissa	0.47	0.26	0.36	0.50	0.33	0.89	0.70	0.44	0.88	0.88	0.75	0.41	0.86
Punjab	0.11	0.09	0.14	0.20	0.49	0.52	0.49	0.41	0.55	0.34	0.27	0.52	0.34
Rajasthan	0.71	0.64	0.58	0.90	1.00	0.70	0.73	0.74	0.76	0.61	0.52	0.34	0.60
Sikkim	0.33	0.10	0.11	0.33	0.44	0.83	0.76	0.50	0.86	0.59	0.60	0.45	0.63
Tamil	0.30	0.00	0.00	0.26	0.12	0.74	0.64	0.65	0.77	0.47	0.29	0.52	0.42
Tripura	0.82	0.19	0.34	0.57	0.21	0.97	0.70	0.38	0.94	0.97	0.76	0.28	0.90
Uttar Pradesh	0.69	0.92	0.79	0.78	0.82	0.70	0.62	0.47	0.72	0.60	0.51	0.69	0.61
Uttaranchal	0.19	0.34	0.34	0.28	0.36	0.80	0.63	0.44	0.79	0.86	0.56	0.24	0.74
West Bengal	0.93	0.22	0.30	0.80	0.48	0.91	0.77	0.29	0.91	0.93	0.65	0.24	0.82

Table 3: showing last 14 standardized variables

State	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}	X_{26}	X_{27}
Andhra Pradesh	0.07	0.03	0.20	0.27	0.32	0.71	0.31	0.39	0.33	0.28	0.52	0.36	0.18	0.64
Arunachal Pradesh	0.44	0.19	1.00	0.63	0.30	1.00	0.13	0.16	0.01	0.01	0.01	0.01	0.01	0.01
Assam	0.37	0.04	0.22	0.80	0.38	0.52	0.04	0.06	0.13	0.15	0.07	0.13	0.13	0.15
Bihar	0.12	0.30	0.03	0.70	0.26	0.46	0.08	0.12	0.48	0.54	0.26	0.45	0.67	0.42
Chhattisgarh	0.41	0.01	0.34	0.73	0.30	0.82	0.03	0.05	0.11	0.11	0.11	0.12	0.07	0.15
Delhi	0.04	0.09	0.01	0.22	0.22	0.42	1.00	1.00	0.07	0.00	0.31	0.07	0.02	0.06
Goa	0.06	0.01	0.06	0.00	0.00	0.57	0.39	0.49	0.00	0.00	0.01	0.00	0.00	0.00
Gujarat	0.13	0.04	0.02	0.58	0.21	0.07	0.25	0.28	0.24	0.19	0.46	0.26	0.13	0.45
Haryana	0.04	0.16	0.00	0.33	0.44	0.31	0.23	0.28	0.11	0.09	0.17	0.12	0.06	0.09
Himachal Pradesh	0.01	0.07	0.00	0.22	0.33	0.35	0.27	0.32	0.02	0.03	0.01	0.03	0.01	0.02
Jharkhand	0.18	0.04	0.29	0.61	0.10	0.54	0.00	0.01	0.15	0.14	0.16	0.15	0.14	0.12
Jammu Kashmir	0.08	0.04	0.00	0.45	0.44	0.00	0.09	0.13	0.05	0.05	0.06	0.05	0.05	0.03
Karnataka	0.07	0.01	0.04	0.30	0.24	0.33	0.22	0.27	0.00	0.00	0.00	0.00	0.00	0.00
Kerala	0.02	0.01	0.02	0.28	0.37	0.67	0.47	0.64	0.11	0.07	0.25	0.13	0.01	0.04
Maharashtra	0.16	0.01	0.01	0.37	0.07	0.24	0.27	0.29	0.44	0.32	0.88	0.48	0.15	0.72
Manipur	0.65	0.27	0.05	0.75	0.41	0.72	0.20	0.27	0.01	0.01	0.01	0.01	0.01	0.01
Meghalaya	0.52	0.12	0.11	0.74	0.77	0.76	0.07	0.08	0.01	0.01	0.01	0.01	0.01	0.02
Mizoram	1.00	1.00	0.02	1.00	1.00	0.61	0.29	0.34	0.00	0.00	0.01	0.00	0.00	0.01
Madhya Pradesh	0.25	0.03	0.06	0.73	0.44	0.38	0.01	0.03	0.33	0.31	0.40	0.34	0.24	0.48
Nagaland	0.46	0.02	0.10	0.72	0.43	0.53	0.08	0.11	0.01	0.01	0.01	0.01	0.01	0.01

Orissa	0.51	0.02	0.22	0.74	0.23	0.56	0.04	0.07	0.17	0.18	0.13	0.18	0.12	0.16
Punjab	0.00	0.03	0.01	0.11	0.12	0.64	0.62	0.72	0.11	0.09	0.18	0.12	0.06	0.14
Rajasthan	0.12	0.20	0.01	0.59	0.47	0.14	0.08	0.08	0.32	0.31	0.35	0.33	0.29	0.46
Sikkim	0.30	0.34	0.57	0.61	0.33	0.68	0.30	0.35	0.00	0.00	0.00	0.00	0.00	0.00
Tamil	0.03	0.00	0.00	0.22	0.29	0.60	0.36	0.43	0.25	0.17	0.55	0.29	0.04	0.34
Tripura	0.79	0.49	0.29	0.87	0.72	0.58	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01
Uttar Pradesh	0.19	0.15	0.01	0.66	0.37	0.26	0.12	0.15	1.00	1.00	1.00	1.00	1.00	1.00
Uttaranchal	0.08	0.17	0.01	0.46	0.38	0.55	0.15	0.21	0.05	0.04	0.06	0.05	0.02	0.04
West Bengal	0.25	0.08	0.05	0.76	0.61	0.44	0.02	0.04	0.37	0.34	0.49	0.39	0.24	0.43

As the variables are different by nature, the combination of the variables cannot be done by summing the standardized values of the variables. To get objective weights for combinations, Principal Component Analysis (PCA) (using Statistica software) has been applied. The factor loadings are being used as weights.

Table 4: showing the factor loading corresponding to factor1 by PCA

Variable	Factor Loading for Factor 1
X01	0.54792
X02	-0.02921
X03	0.05936
X04	0.56902
X05	0.36059
X06	0.93630
X07	0.82407
X08	0.41493
X09	0.93181
X10	0.90812
X11	0.78071
X12	0.27593
X13	0.87215
X14	-0.01628
X15	0.09592
X16	0.22929
X17	0.22225
X18	0.02726
X19	-0.01814
X20	-0.26983
X21	-0.31506
X22	0.09789
X23	0.12712
X24	-0.00397
X25	0.08926
X26	0.14443
X27	0.08209

State Index = $0.54792*X_{01}$ $-0.02921*X_{02}$ $+0.05936*X_{03}$ $+0.56902*X_{04}+0.36059*X_{05}+$ $0.93630*X_{06}+$ $0.82407*X_{07}+0.41493*X_{08}+0.93181*X_{09}+0.90812*X_{10}+0.78071*X_{11}+0.27593*X_{12}+0.87215*X_{13}-0.01628*X_{14}+0.09592*X_{15}+0.22929*X_{16}+0.22225*X_{17}+0.02726*X_{18}-0.01814*X_{19}-0.26983*X_{20}-0.31506*X_{21}+0.09789*X_{22}+0.12712*X_{23}-0.00397*X_{24}+0.08926*X_{25}+0.14443*X_{26}+0.08209*X_{27}$

Table 5: showing index-values for the states with ranks

State	Index	Rank
Andhra Pradesh	5.529	23
Arunachal Pradesh	4.959	18
Assam	6.695	27
Bihar	6.709	28
Chhattisgarh	5.501	22
Delhi	2.594	6
Goa	1.929	3
Gujarat	4.671	15
Haryana	4.369	13
Himachal Pradesh	2.962	7
Jharkhand	6.723	29
Jammu Kashmir	3.705	10
Karnataka	4.153	12
Kerala	1.647	2
Maharashtra	3.978	11
Manipur	2.335	4
Meghalaya	4.954	17
Mizoram	3.412	8
Madhya Pradesh	5.385	19
Nagaland	0.560	1
Orissa	5.590	24
Punjab	2.557	5
Rajasthan	5.408	20
Sikkim	4.730	16
Tamil	3.637	9
Tripura	6.022	25
Uttar Pradesh	5.458	21
Uttaranchal	4.552	14
West Bengal	6.095	26

Smaller the index is better the state. Thus, Nagaland, Goa are better states and Assam, Bihar, Jharkhand are not so batter states.

4. Conclusion

Based on Census 2011 and Family Health Survey, it is to state that the variables considered are large in number but are relevant. We have developed an index with the variables. The weights are selected using PCA. As per developed index, the states has been ranked. Nagaland is the best and Jharkhand is the yet to develop state in this respect. Further studies may be initiated to point more realist factor for such situations.

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