

VARIABILITY OF ACTIVE HEALTH EXPECTANCY AMONG PROVINCES OF CHINA AND ITS DETERMINANTS

Xiaochun Qiao
PhD and Professor
Institute of Population Research
Peking University

Wenzhen Ye
PhD and Professor
Xiamen University

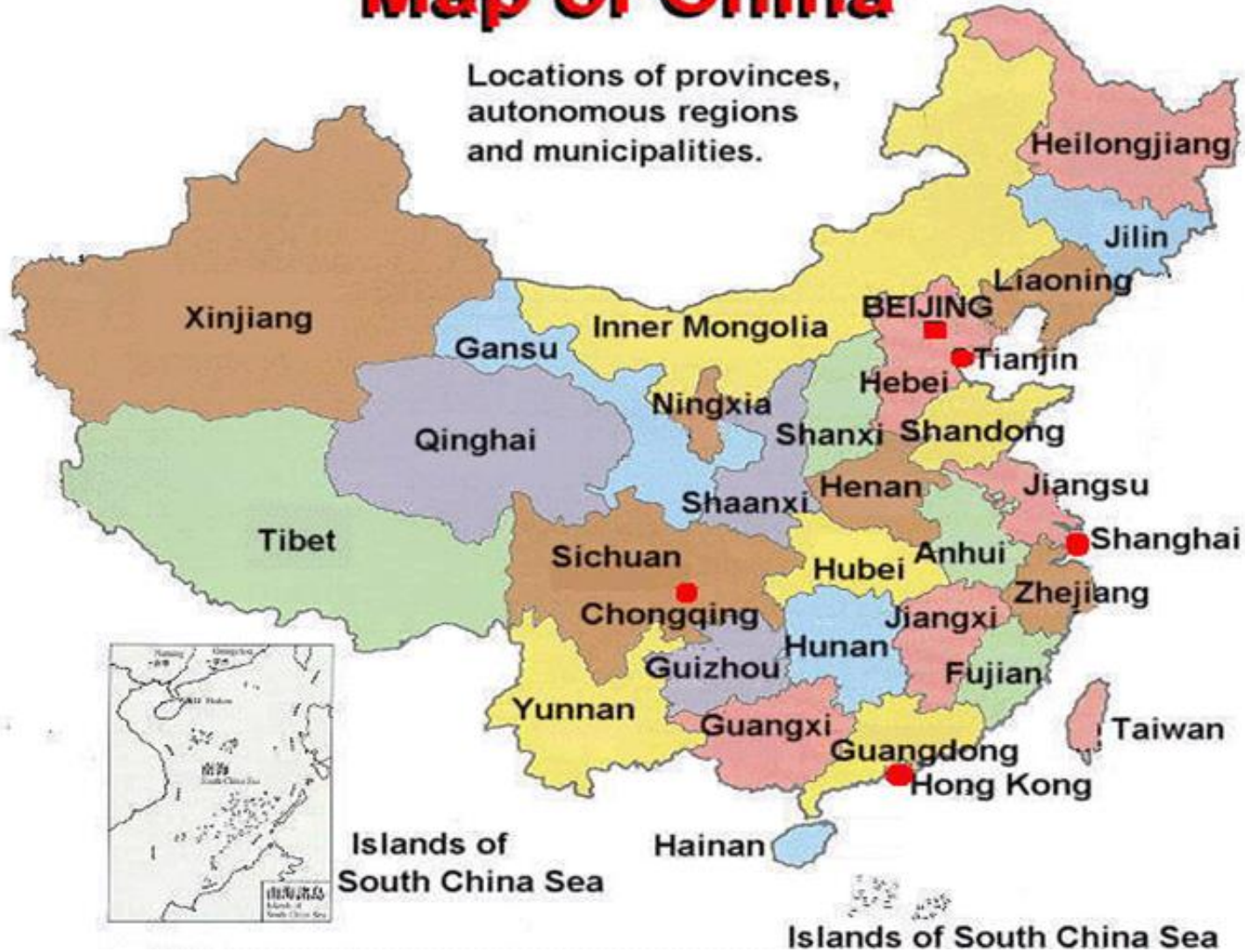
REVES2016 VIENNA, JUNE 8-10, 2016

OBJECTIVES

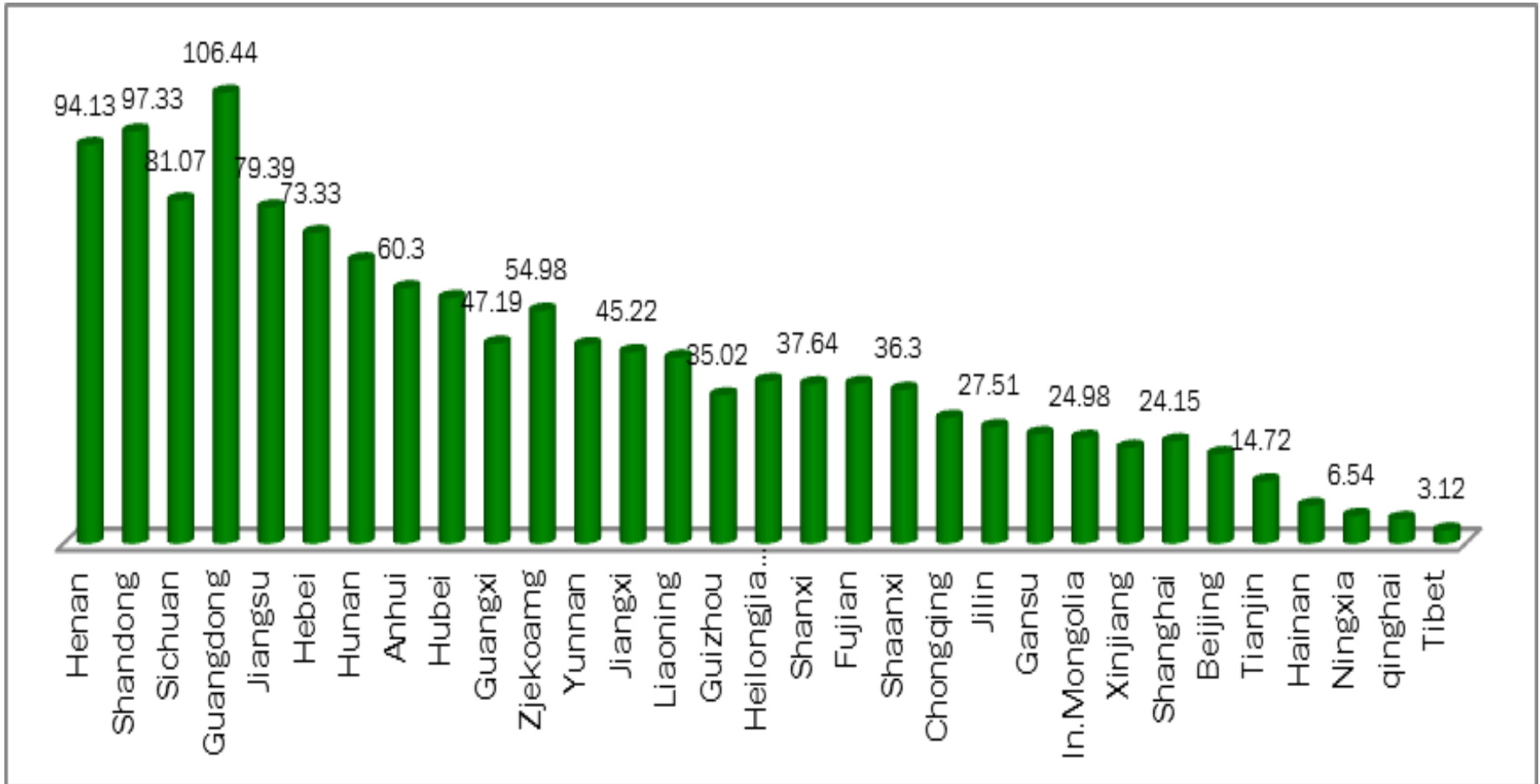
- Chinese population in mainland reached 1,374.62 million at the end of 2015.
- There are 31 provincial level areas, including Provinces, Autonomous regions and Municipalities, in Mainland China.
- Differences of socioeconomic development among provincial areas are also substantial.
- The objective of this paper is to measure (1) the difference of health expectancy and quality of life among the different provincial areas and (2) its determinants by population and economic development of provincial areas.

Map of China

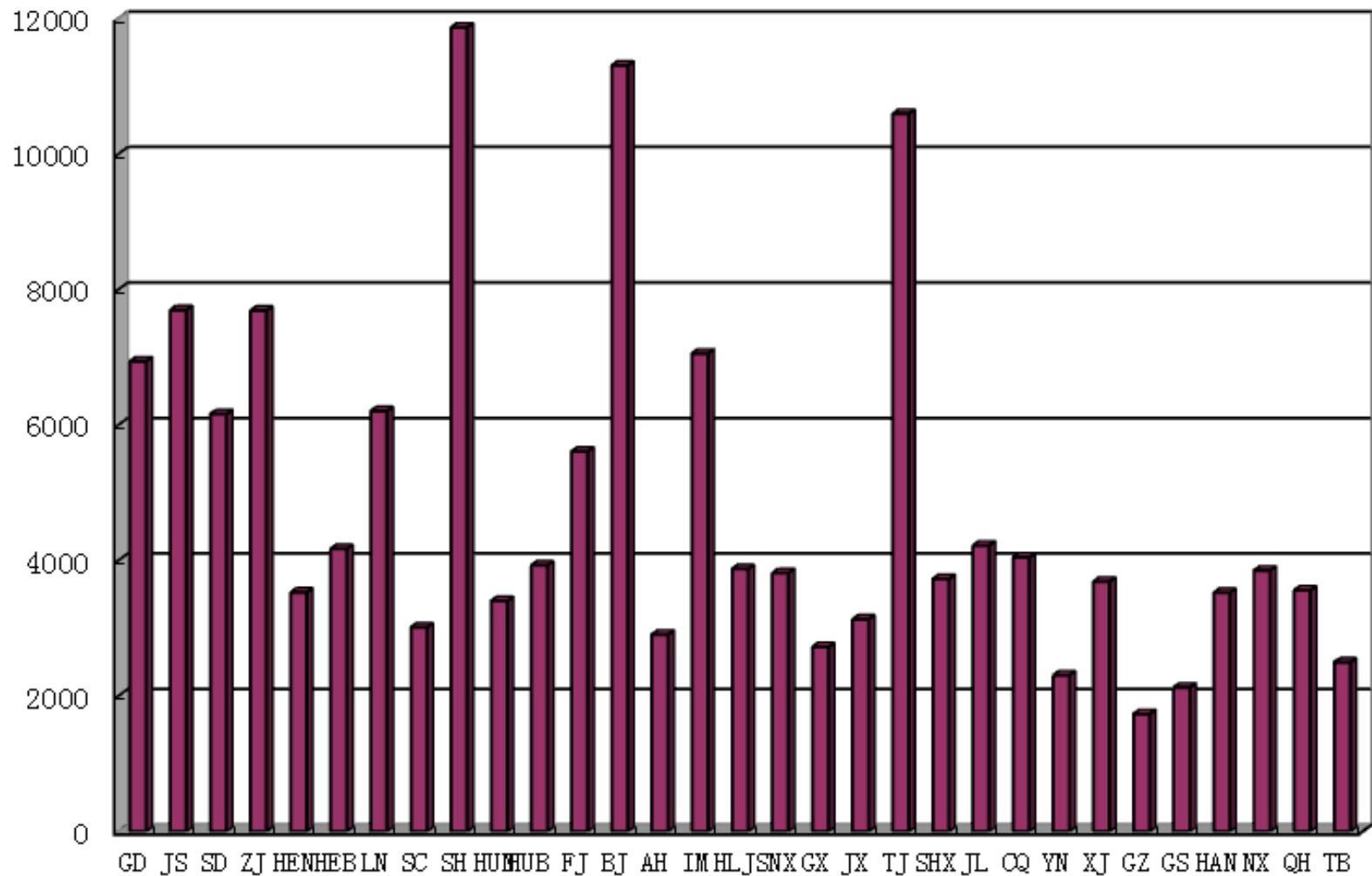
Locations of provinces,
autonomous regions
and municipalities.



DIFFERENCES IN POPULATION (2010)



DIFFERENCES IN GDP PER CAPITA (2010)



DIFFERENCES IN GDP PER CAPITA IN LOCATION



DATA AND METHODS

- The data are population, rather than sample, from the 2010 national census of China.
- It is the first time that health status of elderly aged 60 above was measured in China's censuses.
- Health status was defined into four categories combining self-rated health and ADL, that is, good health, generally healthy, unhealthy but independent(able to do ADL), and unhealthy and dependent (unable to do ADL).
- Adjusted life tables by provinces for both males and females in 2010 were provided by National Census Office of China.
- Sullivan method for calculating the health expectancy of each province will be used.
- Ordinary linear regression model was used to measure the determinants of health expectancy proportion of healthy duration by various population and economic development indicators.

INDEX OF QUALITY OF LIFE

- The ideal state for the health of elderly is not only living longer but living healthier.
- Living longer can be represented by life expectancy and living healthier can be represented by proportion of healthy duration.
- For the ideal state, we expect higher life expectancy and lower proportion of unhealthy life expectancy.
- We combine the life expectancy and the proportion of unhealthy life expectancy to represent the extent of quality of life of the elderly among provinces, called as an index of quality of life by dividing life expectancy by proportion of unhealthy life expectancy.
- The index should be larger if the numerator is higher and the denominator is lower. This represents a better quality of life.

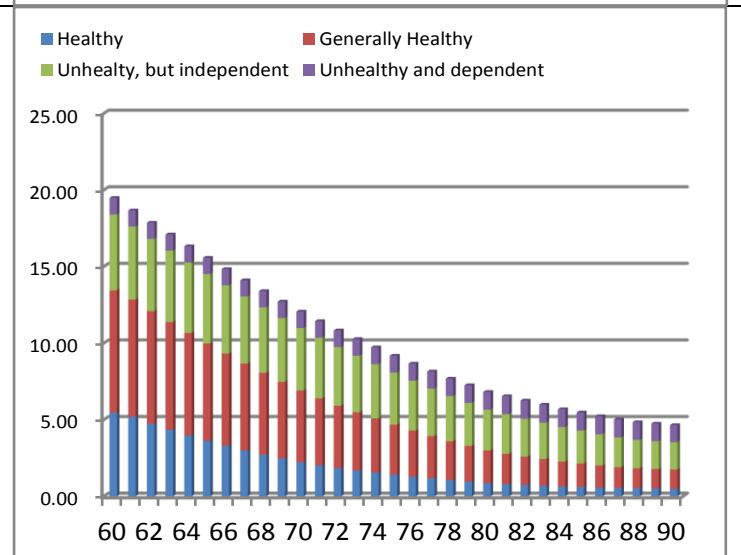
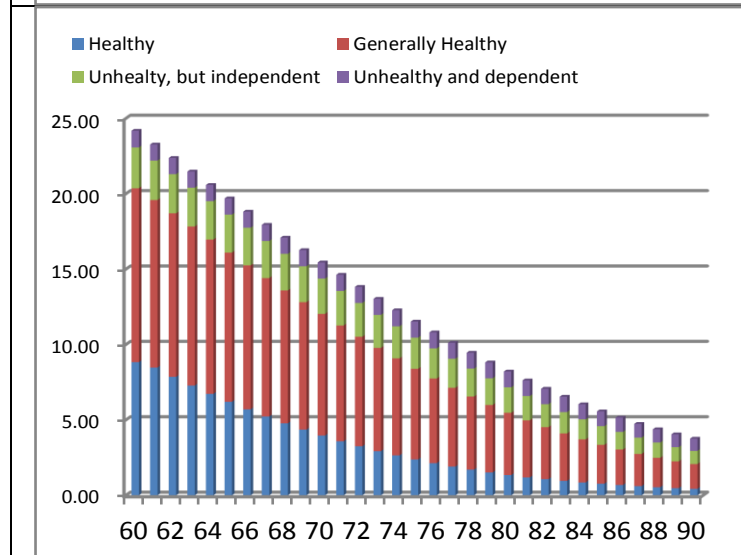
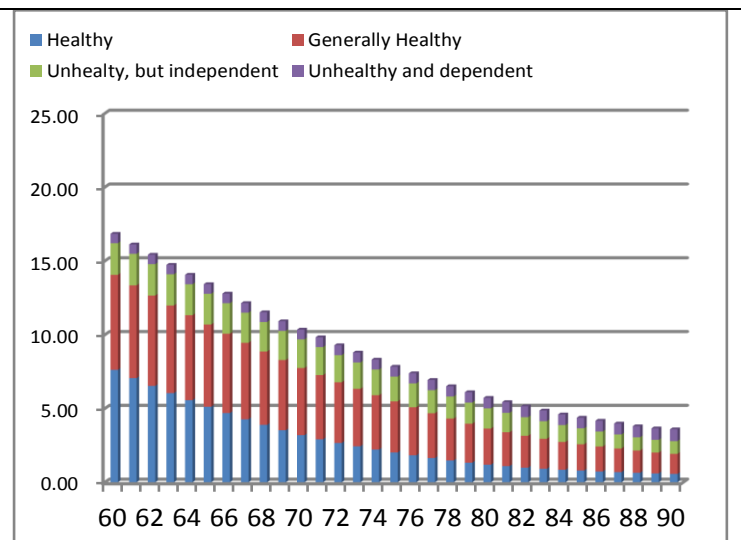
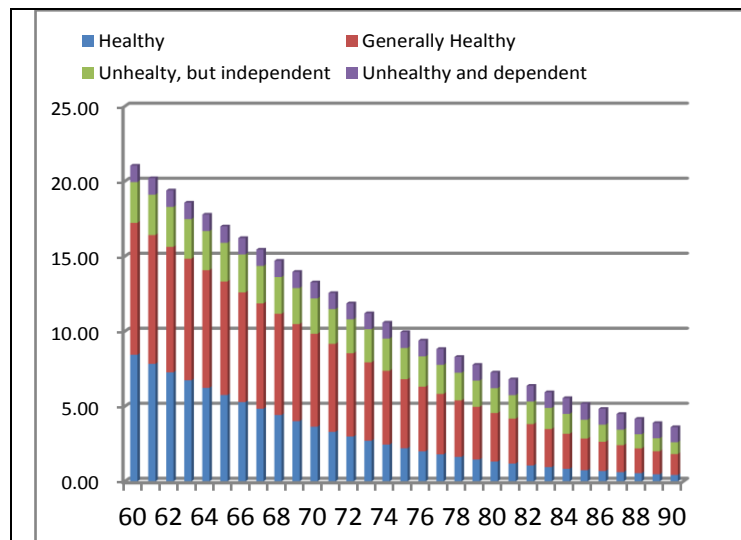
HEALTH EXPECTANCIES AND PROPORTIONS BY AGE ABOVE 60 AND SEX, CHINA, 2010

Area	Exact Age	Males					Females				
		Healthy	Generally Healthy	Unhealthy, but independent	Unhealthy and dependent	Life Expectancy	Healthy	Generally Healthy	Unhealthy, but independent	Unhealthy and dependent	Life Expectancy
Expected year	60	8.17	6.91	2.54	0.57	18.19	7.81	8.99	3.63	0.84	21.28
	65	5.51	5.98	2.47	0.57	14.54	5.43	7.56	3.39	0.81	17.19
	70	3.47	4.88	2.33	0.57	11.25	3.48	6.01	3.14	0.81	13.44
	80	1.30	2.64	1.75	0.59	6.29	1.35	3.08	2.27	0.81	7.51
	90	0.59	1.33	1.11	0.66	3.69	0.61	1.50	1.32	0.69	4.12
Proportion	60	44.91	38.01	13.97	3.11	100.0	36.72	42.25	17.08	3.95	100.0
	65	37.91	41.15	17.02	3.92	100.0	31.58	43.96	19.74	4.72	100.0
	70	30.85	43.37	20.70	5.09	100.0	25.89	44.73	23.36	6.01	100.0
	80	20.67	42.02	27.87	9.45	100.0	17.94	41.09	30.21	10.76	100.0
	90	15.94	36.04	30.11	17.91	100.0	14.72	36.44	32.07	16.77	100.0

DECOMPOSITION OF LIFE EXPECTANCY BY FOUR CATEGORIES AND EXACT AGES

UPPER LEFT: BEIJING, MALES, UPPER RIGHT: YUNNAN, MALES

LOWER LEFT: SHANGHAI, FEMALES, LOWER RIGHT: GANSU, FEMALES



UNHEALTHY LE, LE, PROPORTION OF QUALITY OF LIFE AT 65 BY SEX AND PROVINCE

Provinces	Males				Females			
	Unhealthy LE	LE	Prop. of Unhealthy LE	Index of Quality of Life	Unhealthy LE	LE	Prop. of Unhealthy LE	Index of Quality of Life
Beijing	3.67	16.99	21.59	0.79	5.07	19.38	26.15	0.74
Tianjin	3.16	16.60	19.06	0.87	4.02	18.19	22.07	0.82
Hebei	3.19	13.96	22.82	0.61	4.35	16.41	26.50	0.62
Shanxi	3.41	14.02	24.33	0.58	4.77	16.45	29.02	0.57
In. Mongolia	3.52	14.40	24.41	0.59	4.92	16.64	29.56	0.56
Liaoning	3.27	15.44	21.19	0.73	4.33	17.39	24.87	0.70
Jilin	4.05	15.67	25.88	0.61	5.26	17.61	29.87	0.59
Heilongjiang	3.68	15.01	24.53	0.61	5.01	17.79	28.15	0.63
Shanghai	2.59	16.86	15.38	1.10	3.59	19.69	18.23	1.08
Jiangsu	2.29	14.80	15.45	0.96	3.14	17.43	18.02	0.97
Zhejiang	2.45	15.89	15.41	1.03	3.13	18.44	16.97	1.09
Anhui	3.71	14.59	25.39	0.57	5.39	17.57	30.66	0.57
Fujian	2.05	14.82	13.83	1.07	2.70	17.73	15.21	1.17
Jiangxi	2.56	14.15	18.06	0.78	3.73	17.32	21.51	0.80
Shandong	2.84	14.91	19.07	0.78	3.96	17.76	22.27	0.80
Henan	2.99	13.72	21.81	0.63	4.47	17.12	26.10	0.66
Hubei	3.61	14.19	25.43	0.56	5.11	16.75	30.51	0.55
Hunan	4.12	15.42	26.70	0.58	5.58	18.05	30.91	0.58
Guangdong	1.91	15.08	12.67	1.19	2.69	18.46	14.57	1.27
Guangxi	2.79	14.95	18.63	0.80	4.37	18.96	23.07	0.82
Hainan	3.31	15.40	21.51	0.72	5.42	19.49	27.79	0.70
Chongqing	3.96	15.97	24.81	0.64	5.06	18.35	27.60	0.66
Sichuan	3.85	15.50	24.88	0.62	5.16	17.90	28.83	0.62
Guizhou	3.63	14.75	24.61	0.60	4.77	17.19	27.78	0.62
Yunnan	2.73	13.43	20.37	0.66	3.82	15.87	24.08	0.66
Tibet	4.44	13.59	32.70	0.42	6.13	16.52	37.10	0.45
Shaanxi	3.51	14.58	24.06	0.61	4.64	16.53	28.11	0.59
Gansu	4.10	13.59	30.16	0.45	5.58	15.57	35.87	0.43
Qinghai	3.48	14.46	24.08	0.60	4.94	16.32	30.26	0.54
Ningxia	3.42	14.39	23.75	0.61	4.71	15.95	29.51	0.54
Xinjiang	3.49	15.15	23.03	0.66	4.93	17.26	28.55	0.60

SIMPLE RELATIONSHIP

- What caused the differences of life expectancy, health expectancy, and proportion of healthy life expectancy among different provinces?
- Some relevant variables, such as GDP per capita, proportion of urban population, mean of disposable income, number of health workers per 10 thousand people, life expectancy at age 0, Illiteracy rate, and elderly dependency ratio by provinces.

Dependent		Independents (Simple linear Regression)						
		GDPPC	Purban	MDI	HW10Th	MLE0/ FLE0	MIIR/FIIR	EldDep
Males	LE65	R2= 0.519 F= 31.280	R2=0.628 F=49.027	R2=0.569 F=38.340	R2=0.476 F=26.348	R2=0.594 F=42.432	R2=0.210 F=7.692	R2=0.041 F=1.248 (Sig=0.273)
	HE65	R2=0.628 F=48.975	R2=0.711 F=71.193	R2=0.685 F=62.950	R2=0.368 F=16.909	R2=0.624 F=48.191	R2=0.363 F=16.542	R2=0.009 F=0.258 (Sig=0.615)
	PHE65	R2=0.316 F=13.386	R2=0.335 F=14.614	R2=0.342 F=15.054	R2=0.079 F=2.177 (Sig=0.126)	R2=0.268 F=10.619	R2=0.321 F=13.682	R2=0.001 F=0.032 (Sig=0.859)
Females	LE65	R2=0.288 F=11.748	R2=0.378 F=17.635	R2=0.425 F=21.471	R2=0.245 F=9.416	R2=0.614 F=46.199	R2=0.147 F=4.997	R2=0.043 F=1.294 (Sig=0.265)
	HE65	R2=0.420 F=20.975	R2=0.475 F=26.210	R2=0.521 F=31.560	R2=0.180 F=6.368	R2=0.603 F=43.969	R2=0.229 F=8.631	R2=0.012 F=0.349 (Sig=0.559)
	PHE65	R2=0.320 F=13.633	R2=0.325 F=13.939	R2=0.343 F=15.169	R2=0.063 F=1.937 (Sig=0.175)	R2=0.339 F=14.849	R2=0.207 F=7.552	R2=0.001 F=0.016 (Sig=0.900)

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Healthy Life Expectancy for Males,
with LE65

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.294	1.639		.790	.438
	GDPPC	1.68E-005	.000	.242	1.064	.299
	Purban	-.030	.023	-.376	-1.259	.221
	EldDeRa	-.109	.036	-.251	-2.991	.007
	PerCaDln	.000	.000	.828	4.048	.000
	HeaWo10th	-.034	.007	-.627	-4.650	.000
	MilliRate	-.109	.032	-.347	-3.455	.002
	MLE65	.824	.148	.661	5.568	.000

a. Dependent Variable: MHthy65

Note: R2 = 0.919, F = 37.154, Sign = 0.000

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Healthy Life Expectancy for Males,
without LE65 without MLE65

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.261	1.198		7.732	.000
	GDPPC	-5.8E-006	.000	-.083	-.251	.804
	Purban	.033	.031	.416	1.054	.302
	EldDeRa	.000	.046	.000	.003	.998
	PerCaDln	.000	.000	.814	2.651	.014
	HeaWo10th	-.023	.011	-.433	-2.213	.037
	MllliRate	-.059	.045	-.189	-1.308	.203

a. Dependent Variable: MHthy65

Note: R2 = 0.809, F = 16.966, Sign = 0.000

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Proportion of Healthy Life Expectancy for Males without MLE65

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	89.932	5.392		16.680	.000
	GDPPC	.000	.000	.378	1.005	.325
	Purban	-.180	.139	-.579	-1.291	.209
	EldDeRa	-.676	.207	-.393	-3.259	.003
	PerCaDIn	.001	.000	1.372	3.929	.001
	HeaWo10th	-.222	.048	-1.035	-4.653	.000
	MIlliRate	-.770	.204	-.620	-3.771	.001

a. Dependent Variable: MPHthy65

Note: $R^2 = 0.753$, $F = 12.2$, $sign = 0.000$

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Male Index

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.830	.210		3.943	.001
	GDPPC	8.42E-007	.000	.074	.209	.836
	Purban	.000	.005	-.023	-.055	.957
	EldDeRa	-.023	.008	-.325	-2.852	.009
	PerCaDIn	3.50E-005	.000	1.421	4.309	.000
	HeaWo10th	-.009	.002	-1.053	-5.015	.000
	MilliRate	-.015	.008	-.289	-1.863	.075

a. Dependent Variable: MIndex

Note: R² = 0.780, F = 14.169, Sign = 0.000

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Healthy Life Expectancy for Females with LE65

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.080	2.248		.036	.972
	GDPPC	2.00E-005	.000	.221	.868	.394
	Purban	-.029	.030	-.281	-.947	.353
	EldDeRa	-.120	.046	-.211	-2.630	.015
	PerCaDln	.000	.000	.928	3.600	.002
	HeaWo10th	-.056	.010	-.791	-5.376	.000
	Fllirate	-.064	.024	-.281	-2.663	.014
	FLE65	.858	.141	.606	6.084	.000

a. Dependent Variable: FHthy65

Note: R2 = 0.898, F = 28.843, Sign = 0.000

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Healthy Life Expectancy for Females without FLE65

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.741	1.857		6.322	.000
	GDPPC	-2.8E-005	.000	-.308	-.814	.424
	Purban	.013	.047	.126	.276	.785
	EldDeRa	-.047	.070	-.083	-.681	.503
	PerCaDln	.000	.000	1.533	4.075	.000
	HeaWo10th	-.062	.016	-.873	-3.771	.001
	Fillirate	-.056	.038	-.248	-1.486	.150

a. Dependent Variable: FHthy65

Note; R² = 0.733, F=10.989, Sign =0.000

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Proportion of Healthy Life Expectancy for Females

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	83.619	6.762		12.365	.000
	GDPPC	7.91E-005	.000	.240	.635	.532
	Purban	-.139	.171	-.372	-.810	.426
	EldDeRa	-.589	.253	-.286	-2.327	.029
	PerCaDln	.001	.000	1.564	4.145	.000
	HeaWo10th	-.321	.060	-1.247	-5.369	.000
	Fllirate	-.379	.138	-.461	-2.756	.011

a. Dependent Variable: FPHthy

Note: $R^2 = 0.732$, $F = 10.905$, and $Sign = 0.000$

MULTIVARIATE ANALYSIS AT AGE 65

Linear Regression of Female Index

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.858	.250		3.439	.002
	GDPPC	-9.8E-007	.000	-.078	-.212	.834
	Purban	.000	.006	-.020	-.045	.965
	EldDeRa	-.024	.009	-.305	-2.548	.018
	PerCaDln	4.56E-005	.000	1.689	4.588	.000
	HeaWo10th	-.012	.002	-1.256	-5.546	.000
	Flllirate	-.008	.005	-.244	-1.493	.148

a. Dependent Variable: FIndex

Note; R2 = 0.745, F= 11.666, Sign =0.000

CONCLUSIONS

- No matter which dependent variable was used, the most influential determinants on healthy life expectancy or proportion of healthy life or index of quality of life are two variables, that is, per capita disposable income and the number of health workers within 10 thousand people.
- These variables are independent of population structure in the provincial areas but are strongly attached to individual socioeconomic development of the areas.
- The second influential determinants are elderly dependency ratio and illiterate rate, which are related with population composition.
- The GDP per capita and the proportion of urban population, as macro indicators, did not show the influence on health expectancy.

THANKS