Source: ESCAP, Bangkok 2008

Demographic and Socio-economic determinates of tempo effect of IMR in the ESCAP: A Policy-Long View on Regional Balance

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Abstract

Infant mortality rate is one of the important criteria for evaluating health situation in any society. This paper aims to explore demographic and socio-economic determinates of tempo effect of Infant mortality Rates (IMR) in the ESCAP (Economic and Social Commission for Asia and the Pacific) region between 1950-2005.The concept of tempo of IMR refers to change in the rate during a period of time. Data used in this analysis are mostly taken from the United Nations Population Division for 2006, Human Development Report (HDR), annual report of the UNDP for 2006 and WHO for 2007.Our analysis on 45 Countries of ESCAP region reveals that tempo effect of IMR during 1950-2005 (Divided to four set time series) are different among male and female and gender gap is dwindle. Correlation between tempo effect of IMR with education, GDP, Life expectancy and Urbanization variables are negative and significant statistically. Yet, the future of IMR reduction will remain a challenging.

Key Words:

Infant Mortality Rate, Development and ESCAP.

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Introduction

The most striking demographic phenomenon of the twentieth century was a marked decline in mortality rates accompanied by a dramatic rise in life expectancy, specifically among countries in the developed regions of the world. This decline was most pronounced in the 1960s, leading demographers to coin the term "mortality transition". The term describes essentially a state of high mortality, resulting from the high incidence of infectious and parasitic diseases followed by a state of lower mortality, resulting from the successful control of communicable diseases. The ESCAP region is of prime demographic interest partly because it is the home of over half the world's people. Over the last five decades, the Asian and Pacific region, following global trends, has experienced a remarkable increase in the expectation of life at birth from 41 years in the period 1950-1955 to 67 years in the period 2000-2005. More generally, advances in health-care services and socioeconomic conditions have contributed to the decline in mortality rates. Although this trend is clearly evident in the Asian and Pacific region, there still exists a large disparity in health and mortality conditions between sub regions as well as countries. A distinct pattern emerges with countries in the earlier stages of development struggling to manage health-related mortality problems linked to poorer socio-economic conditions, while countries with more developed economies have to face a new set of challenges posed by emerging health threats stemming from environmental and lifestyle changes (Devasahayam, 2005).

The ESCAP region countries probably more than any other region of the world, are characterized with different levels of socioeconomic development, and health progress.Therefore, this paper tries to find relationship between Infant mortality trends and socioeconomic and health indices in the Asian and Pacific region.

Aim of Study

The main aim of this study is to explore the relation between tempo of Infant mortality Rates (IMR) and demographic and socio-economic determinates in the ESCAP (Economic and Social Commission for Asia and the Pacific) region between 1950-2005. The paper is designed to answer the main question that do countries with different historical experiences and development levels manifest similar patterns of reduction in IMR at the regional level?

Data and Research Methodology

This study is secondary analysis. Statistical population includes 45 countries at the ESCAP region. Data used in this analysis are mostly taken from the United Nations Population Division (2006), Human Development Report (HDR), annual report of the UNDP for 2006 and WHO for 2007. The concept of tempo of Infant mortality rate (IMR) refers to change in the degree of IMR during a period of time. To measure the tempo of IMR, we calculate:

$$TA = \frac{1}{n}(IMR^{t+n} - IMR^{t})$$

Where *TA* is the tempo of IMR, *n* is the number of years, and IMR is the rate of Infant mortality rate at the years t and $t^{+}n$.

Finding

General Picture

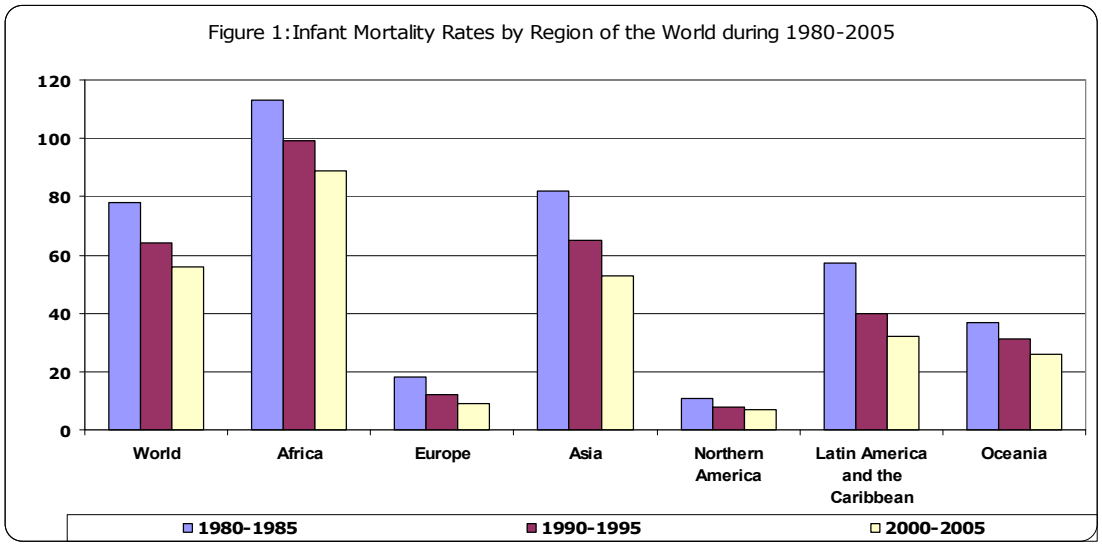
Infant mortality rate is one of the important criteria for evaluating health situation in any society. It is a well-established fact that significant reductions in infant mortality rates have been achieved because of the successful immunization programmers for measles, diphtheria, pertussis (whooping cough), tetanus and tuberculosis. As in much of the rest of the world, infant mortality has been steadily declining in the ESCAP region. In comparison to the other major regions, rates in Asia are only slightly lower than the world average owing to the fact that infant mortality in south-central Asia is still relatively high. If not for the Oceania rate, which is less than half of the world average because of the higher levels of socio-economic development of countries such as Australia and New Zealand, infant mortality rates would have been slightly higher for the region than the actual figures. Nonetheless, a hopeful trend is that since 1980, rates in the sub regions of Asia (except for western Asia) and Oceania have been found to be dropping at a faster pace than in Africa, and Latin America and the Caribbean. (Devasahayam, 2005).

Table 1: Infant mortality rates (per 1,000 live births) by major regions of the world

Region	1980-1985	1990-1995	2000-2005
World	78	64	56
Africa	113	99	89
Europe	18	12	9
Asia	82	65	53
Northern America	11	8	7
Latin America and the Caribbean	57	40	32
Oceania	37	31	26

Source: Devasahayam,2005, P:12.

Table 1 shows changes in Infant mortality rates (IMR) by major regions of the world during 1980-2005. As indicated in this table, trends of IMR have sharply declined in the world. IMR reduction in the first period (1990-1995) was rather than to the second period (2000-2005) and has experienced remarkable changes. The high Infant Mortality Rate belongs to Africa region and the low Infant Mortality Rate belongs to Northern America region (figure1).



A) Demographic and Socio-Economic and Health Characteristics

Table 2 shows demographic indicators of the ESCAP region countries at the threshold of the 21st century. As indicated in this table, majority of the ESCAP region countries varied significantly in terms of population size, annual growth rate, sex ratio and in the Percent of population Urban. Population growth rate for these courtiers varies from -0.48 percent in Russia to 5.31 percent in Timor-Leste. ESCAP region countries have experienced remarkable changes in terms of Sex ratio. The difference in favor of women had become more noticeable in 2005. Table 3 shows socioeconomic and Health Indices for ESCAP region Countries at the threshold of the 21st. As indicated in this table, all of the ESCAP region countries varied significantly in IMR and Human Development Indices (LE, GDP, EDU and HDI). Trends of IMR have sharply declined for Both Sexes and followed from the world trends. IMR varies from 2 per 1000 in Singapore, to 95 per 1000 in Cambodia in 2007.

Table 2: Demographic Indicators for ESCAP region Countries at the threshold of the 21st Century

Region	Country	Population (thousands) 2005*	Population growth rate (%)2000-2005*	Sex Ratio 2005*	Urban population % of Total (2004)**
NORTHERN AMERICA	United States	299846	1.03	96.8	80.5
WESTERN ASIA	Armenia	3018	-0.42	87.4	64.2
	Azerbaijan	8352	0.51	94.6	51.5
	Georgia	4473	-1.07	89.6	52.2
	Turkey	72970	1.36	101.6	66.8
SOUTH CENTRAL ASIA	Bangladesh	153281	1.89	104.9	24.7
	Bhutan	637	2.63	111.1	10.8
	India	1134403	1.62	107.5	28.5
	Iran	69421	0.97	102.9	66.4
	Kyrgyzstan	5204	1.01	97.2	35.7
	Kazakhstan	15211	0.34	91.6	57.1
	Maldives	295	1.57	105.3	29.2
	Nepal	27094	2.08	98.2	15.3
	Pakistan	158081	1.82	106	34.5
	Sri Lanka	19121	0.43	97.7	15.2
	Tajikistan	6550	1.19	98.7	24.9
	Turkmenistan	4833	1.42	97	46
	Uzbekistan	26593	1.46	98.9	36.7
SOUTHEAST ASIA	Brunei	374	2.29	107.5	73.1
	Cambodia	13956	1.76	94.8	19.1
	Indonesia	226063	1.31	99.9	47
	Laos	5664	1.62	99.2	20.3
	Malaysia	25653	1.95	103.3	66.3
	Myanmar	47967	0.89	98.1	30.1
	Philippines	84566	2.08	101.4	61.9
	Singapore	4327	1.49	101.3	100
	Thailand	63003	0.76	95.3	32
	Timor-Leste	1067	5.31	103	26.1
	Vietnam	85029	1.45	100	26
EAST ASIA	China	1312979	0.67	106.8	39.5
	Japan	127897	0.14	95.5	65.7
	Korea, Rep. of	47870	0.46	100.0	80.6
	Mongolia	2581	0.88	99.5	56.6
NORTHERN EUROPE	United Kingdom	60245	0.46	95.8	89.6
WESTERN EUROPE	France	60991	0.6	95	76.5
	Netherlands	16328	0.5	97.8	79.6
EASTERN EUROPE	Russia	143953	-0.48	86.6	73.1
OCEANIA	Australia	20310	1.19	98.9	88
	Fiji	828	0.65	103	50.3
	New Zealand	4097	1.22	96.9	86.1
	Papua New Guinea	6070	2.41	103.2	13.3
	Samoa	184	0.71	108.5	22.3
	Solomon Islands	472	2.57	107.3	16.7
	Tonga	99	0.26	103.7	23.8
	Vanuatu	215	2.54	104.4	23.1

Sources: *United Nations Population Division, (2005), and **HDR (2006)

Table 3: Socioeconomic and Health Indices for ESCAP region Countries

Region	Country	Infant mortality Rate (Both Sexes)*	Human Development Indices**			
			LE Index	GDP Index	EDU Index	HDI
NORTHERN AMERICA	United States	7	0.88	1	0.97	0.948
WESTERN ASIA	Armenia	26	0.78	0.62	0.91	0.768
	Azerbaijan	74	0.7	0.62	0.89	0.736
	Georgia	41	0.76	0.56	0.91	0.743
	Turkey	26	0.73	0.73	0.81	0.757
SOUTH CENTRAL ASIA	Bangladesh	54	0.64	0.49	0.46	0.53
	Bhutan	65	0.64	0.5	0.48	0.538
	India	56	0.64	0.58	0.61	0.611
	Iran	31	0.76	0.72	0.75	0.746
	Kyrgyzstan	58	0.7	0.49	0.92	0.705
	Kazakhstan	27	0.64	0.72	0.96	0.774
	Maldives	33	0.7	0.65	0.87	0.739
	Nepal	56	0.62	0.45	0.51	0.527
	Pakistan	80	0.64	0.52	0.46	0.539
	Sri Lanka	12	0.82	0.63	0.81	0.755
	Tajikistan	59	0.65	0.41	0.9	0.652
	Turkmenistan	81	0.63	0.64	0.91	0.724
	Uzbekistan	57	0.69	0.49	0.91	0.696
SOUTHEAST ASIA	Brunei	8	0.86	0.88	0.88	0.871
	Cambodia	95	0.52	0.53	0.69	0.583
	Indonesia	28	0.7	0.6	0.83	0.711
	Laos	62	0.5	0.5	0.66	0.553
	Malaysia	10	0.81	0.77	0.84	0.805
	Myanmar	74	0.59	0.39	0.76	0.581
	Philippines	25	0.76	0.64	0.89	0.763
	Singapore	2	0.9	0.94	0.91	0.916
	Thailand	18	0.75	0.73	0.86	0.784
	Timor-Leste	52	0.52	0.39	0.63	0.512
	Vietnam	16	0.76	0.55	0.81	0.709
EAST ASIA	China	23	0.78	0.68	0.84	0.768
	Japan	3	0.95	0.95	0.94	0.949
	Korea, Rep. of	6	0.87	0.89	0.98	0.912
	Mongolia	39	0.66	0.5	0.91	0.691
NORTHERN EUROPE	United Kingdom	5	0.89	0.96	0.97	0.94
WESTERN EUROPE	France	4	0.91	0.95	0.97	0.942
	Netherlands	4	0.89	0.96	0.99	0.947
EASTERN EUROPE	Russia	11	0.67	0.77	0.95	0.797
OCEANIA	Australia	5	0.92	0.95	0.99	0.957
	Fiji	16	0.72	0.69	0.87	0.758
	New Zealand	5	0.9	0.91	0.99	0.936
	Papua New Guinea	54	0.51	0.54	0.52	0.523
	Samoa	24	0.76	0.67	0.9	0.778
	Solomon Islands	24	0.63	0.48	0.67	0.592
	Tonga	20	0.79	0.73	0.93	0.815
	Vanuatu	31	0.73	0.57	0.71	0.67

Sources:* WHO (2007), and **Human Development Report (HDR), 2006

B) Changes in Infant Mortality Rates and Tempo of IMR (1950-2000)

Table 4 shows changes in Infant Mortality Rate and Tempo of IMR in ESCAP region countries during 1950-2000.As indicated in this table, The trends of Infant mortality rate has sharply declined in the all of ESCAP region countries, which have been followed from the World trends. These countries also vary in terms of tempo of Infant Mortality rate. During 1950-75, the highest tempo of IMR belonged to china with a rate of (-5.35) and the lowest to Australia with (-0.28). The second period (1975-2000) the highest tempo belonged to Cambodia with (-3,908) while both Netherlands and Russia had the lowest of (-0.256).Tempo of Infant mortality rate reduction in the second period (1975-2000) was rather than to the first period (1950-1975) (Figure 2).

C) Changes in Gender gap (1950-2005)

Table 5 shows changes in Gender Gap in ESCAP region countries in during 1950-2005.As indicated in this table, trends of Gender Gap have sharply declined. Gender Gap reduction in the first period (1950-2000) was rather than to the second period (2000-2005) and has experienced remarkable changes. Gender gap between male and women have dwindled specially in 2000-2005(Figure 3).

Table 4: Changes in Infant mortality Rate and tempo of IMR in ESCAP Region Countries during 1950-2000

Region	Country	Infant Mortality Rates			Tempo of IMR	
		1950_55	1970_75	1995_2000	1950_1975	1975_2000
NORTHERN AMERICA	United States	27.8	18.1	7.5	-0.388	-0.424
WESTERN ASIA	Armenia	83	63	34.3	-0.8	-1.148
	Azerbaijan	120	100	78.4	-0.8	-0.864
	Georgia	80	52	40.5	-1.12	-0.46
	Turkey	233	138	40.4	-3.8	-3.904
SOUTH CENTRAL ASIA	Bangladesh	200.5	148	73	-2.1	-3
	Bhutan	184.8	149.2	69.7	-1.424	-3.18
	India	165.7	116.8	69.5	-1.956	-1.892
	Iran	185.7	114.8	43.6	-2.836	-2.848
	Kyrgyzstan	140	100	59.9	-1.6	-1.604
	Kazakhstan	110	76.9	43.4	-1.324	-1.34
	Maldives	185.2	120.6	54.8	-2.584	-2.632
	Nepal	210.9	156.1	73.2	-2.192	-3.316
	Pakistan	168.6	127.6	83.2	-1.64	-1.776
	Sri Lanka	76.6	49.9	15.1	-1.068	-1.392
	Tajikistan	160	124.6	79.6	-1.416	-1.8
	Turkmenistan	150	110.6	75.9	-1.576	-1.388
	Uzbekistan	125	84.3	58.1	-1.628	-1.048
SOUTHEAST ASIA	Brunei	68	54	6.7	-0.56	-1.892
	Cambodia	165.1	180.9	83.2	0.632	-3.908
	Indonesia	201.2	125.5	44.7	-3.028	-3.232
	Laos	170	140.8	73.3	-1.168	-2.7
	Malaysia	98.8	42.4	11.6	-2.256	-1.232
	Myanmar	180.8	106.2	75.9	-2.984	-1.212
	Philippines	134.2	79.7	34.4	-2.18	-1.812
	Singapore	66	18.9	3.5	-1.884	-0.616
	Thailand	118.1	55.8	15.7	-2.492	-1.604
	Timor-Leste	264.3	183.3	97.5	-3.24	-3.432
	Vietnam	158	106.7	28.9	-2.052	-3.112
EAST ASIA	China	195	61.1	28	-5.356	-1.324
	Japan	50.6	11.5	3.8	-1.564	-0.308
	Korea, Rep. of	115	38	8.3	-3.08	-1.188
	Mongolia	148.1	97.7	48.7	-2.016	-1.96
NORTHERN EUROPE	United Kingdom	28.5	17.4	5.9	-0.444	-0.46
WESTERN EUROPE	France	45	15.9	4.7	-1.164	-0.448
	Netherlands	24.2	11.7	5.3	-0.5	-0.256
EASTERN EUROPE	Russia	97.5	27.7	21.3	-2.792	-0.256
OCEANIA	Australia	23.6	16.6	6.3	-0.28	-0.412
	Fiji	80.3	52.4	24.4	-1.116	-1.12
	New Zealand	26.3	16.1	6.4	-0.408	-0.388
	Papua New Guinea	157.7	111.5	67.2	-1.848	-1.772
	Samoa	107.1	68.5	29.9	-1.544	-1.544
	Solomon Islands	146	91	66.9	-2.2	-0.964
	Tonga	58.9	37.3	23.2	-0.864	-0.564
	Vanuatu	169	99	42.3	-2.8	-2.268

Source: United Nations Population Division, (2006).

Table 5: Changes in Gender Gap of IMR in ESCAP region Countries 1950-2005

Region	Country	1950_55	1970_75	1995_2000	2000_2005
NORTHERN AMERICA	United States	1.7	3.9	0.3	0
WESTERN ASIA	Armenia	10.8	9.1	4.8	4
	Azerbaijan	9.1	7.2	6.2	6.2
	Georgia	13.9	10.4	8.6	8.5
	Turkey	42.4	28.5	9.5	8.4
SOUTH CENTRAL ASIA	Bangladesh	-1.8	1.7	2.3	3.5
	Bhutan	10	14.2	11.6	9.1
	India	0.9	-2	-3.3	-3.3
	Iran	9.8	-3.3	-0.4	1.1
	Kyrgyzstan	40.3	29.2	11.4	9.8
	Kazakhstan	44.5	32.3	11.4	9.2
	Maldives	-8.5	-12.7	-10.8	-4.7
	Nepal	1.7	2.8	0.3	0.1
	Pakistan	-1	-1.6	-2	-4.1
	Sri Lanka	13.7	8.9	2.9	2.3
	Tajikistan	23	11.9	8.2	6.4
	Turkmenistan	23.7	20.1	15.9	17
	Uzbekistan	19.4	15	11.3	11.3
SOUTHEAST ASIA	Brunei	20.6	21.6	3.3	2.3
	Cambodia	24.9	27.2	11	7.7
	Indonesia	19.2	17.8	10.4	8.8
	Laos	32.6	21.4	9.3	7.7
	Malaysia	15.3	8.9	4.3	3
	Myanmar	47	25.1	17	17.1
	Philippines	24.9	15	10.5	9.7
	Singapore	16.9	6.3	0.6	0.1
	Thailand	9.8	8.9	3.8	2.8
	Timor-Leste	23.4	19.2	8.6	5.7
	Vietnam	21.8	26.2	6.3	6.2
EAST ASIA	China	48.9	0.8	-9.5	-11.5
	Japan	4.9	1.2	0.4	0.4
	Korea, Rep. of	29.7	17.2	4.6	0.6
	Mongolia	12.5	7.8	3.7	6.8
NORTHERN EUROPE	United Kingdom	8.5	5.8	1.1	0.5
WESTERN EUROPE	France	7.6	3.1	1.1	0.8
	Netherlands	4.3	2.3	1.1	0.8
EASTERN EUROPE	Russia	17.1	12.6	6	4.7
OCEANIA	Australia	5.1	3.9	1.8	0.7
	Fiji	8	5.5	2.7	2.7
	New Zealand	2.4	1.5	0.6	0
	Papua New Guinea	28.6	15.2	11.1	10.5
	Samoa	28.9	14.6	3.6	2.6
	Solomon Islands	14.4	7.3	1.9	2.6
	Tonga	-9.2	-8.3	-8.2	-8.1
	Vanuatu	26.1	17.1	8.5	8.4

Source: United Nations Population Division, (2006).

Figure 2:Changes in Infant Mortality rates in ESCAP region countries,1950-2000

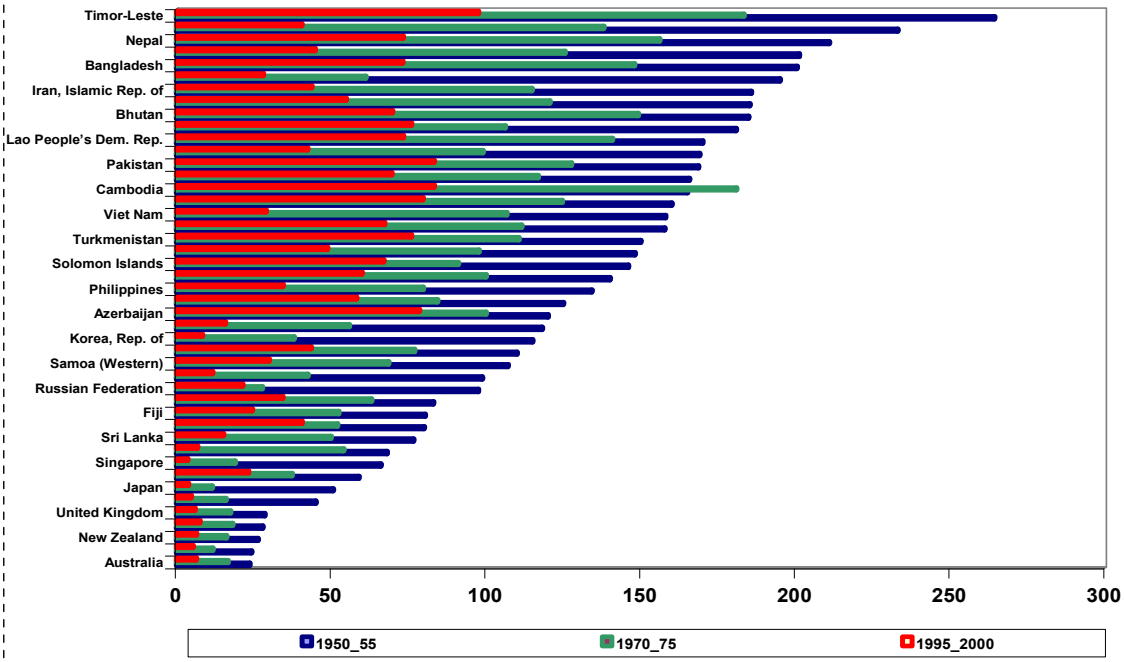


Figure 3:Changes in Gender Gap of IMR in the selected ESCAP Region Countries,1950-2005

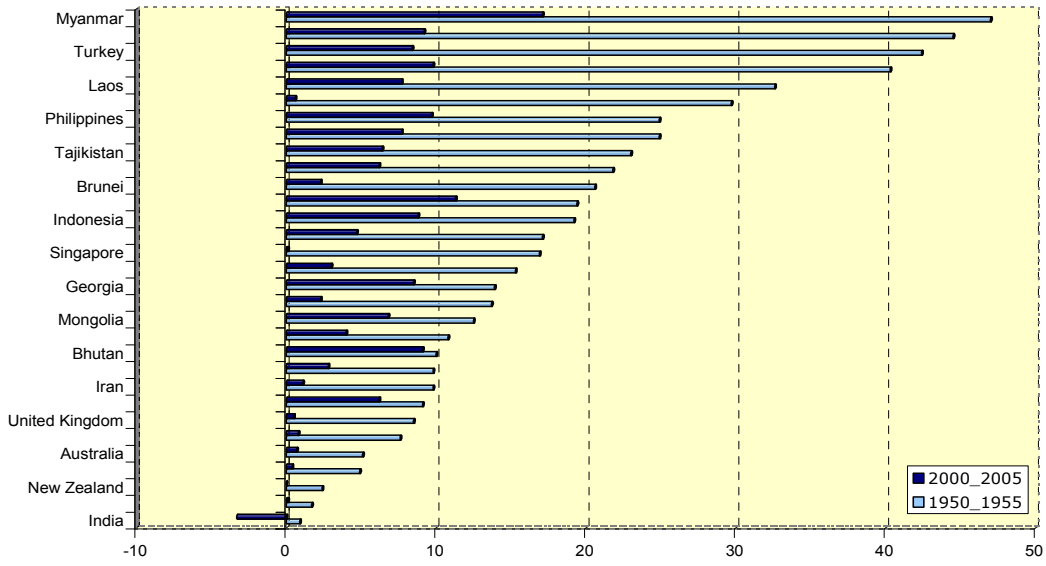


Table 6 shows classification of ESCAP region countries by PGR and IMR at the threshold of 21st Century. As indicated in this table, ESCAP region countries has classified at three levels (Low, Medium and High) by their PGR and IMR. When examining the IMR and GPR, the highest index is observed in Bhutan, Nepal, Papua New Guinea and Timor-Leste countries. Of all the countries, 12 countries had low levels in terms of population growth and Infant Mortality rate. Nine countries have experienced the medium population growth rate with high Infant Mortality rate, and the rest were distributed in other levels. We can see commensurate levels at the Low and high classifications.

Table6: Classification ESCAP Region Countries by PGR and IMR in the threshold of 21st Century

PGR \ IMR		Infant Mortality Rates (Per 1000 live birth)		
		LOW (<25)	**MEDIAN (25 - 49)**	**HIGH (50 - 99)**
Annual Population Growth rate (%) ,2000-2005	**LOW** (<1,0)	Japan France Netherlands United Kingdom Korea, Rep. of Tonga Russia Thailand Samoa China Fiji Sri Lanka	Iran Kazakhstan Armenia Georgia Mongolia	Azerbaijan Myanmar
	MEDIAN (1.01 - 2)	Australia United States New Zealand Singapore Malaysia Vietnam	Turkey Maldives Indonesia	Turkmenistan Kyrgyzstan Uzbekistan Tajikistan India Cambodia Laos Pakistan Bangladesh
	HIGH (2.1 to up)	Brunei Philippines Solomon Islands	Vanuatu	Bhutan Nepal Papua New Guinea Timor-Leste

Table 7 shows correlation between IMR and Socioeconomic Indices in the ESCAP region countries at the threshold of 21st Century. As indicated in this table, the Pearson correlation coefficient between IMR and PGR was 0.310 and significant statistically. Relation between IMR and education, life expectancy and GDP are negative and significant statistically at the 0.01 level (Upper 99%).When we entered population growth rate as a covariate variable in this model, it had not remarkable changes.

Table7: Correlation between IMR and Socioeconomic Indices in ESCAP region Countries at the threshold of 21st Century

Independent variable	Dependent variable	Zero order Correlation	Covariate	Partial Correlation	Sig.
Population Grow Rate	IMR	.310*			Upper 95%
Education	IMR	-.592**	PGR	-.5339	Upper 99%
Life Expectancy	IMR	-.817**	PGR	-.7974	Upper 99%
Gross Domestic Product	IMR	-.778**	PGR	-.7506	Upper 99%

**: Correlation is significant at the 0.01 level (2-tailed)

*: Correlation is significant at the 0.05 level (2-tailed)

Summary and Policy Implications on Regional Balance

This paper declared that countries in the ESCAP(Economic and Social Commission for Asia and the Pacific) region Countries are going through demographic characterized by a reduction in Infant mortality rates. Majority of the ESCAP region countries varied significantly in terms of population size, annual growth rate, and population density and population sex ratio and in the Percent of population Urban. Trends of IMR have sharply declined and followed from the world. IMR reduction in the first period (1950 -1975) was rather than to the second period (1975-2000) and has experienced remarkable changes in both sexes. Gender gap between male and women have dwindled specially at the threshold of 21st Century.

Social and human development indicators for ESCAP showed marked improvement in the 1990s, continuing a trend established over earlier decades. Pearson correlation coefficient between IMR and PGR was 0.310 and significant statistically. Relation between IMR and education, life expectancy and GDP are negative and significant statistically at the 0.01 level (Upper 99%).When we entered population growth rate as a covariate variable in this model, it had not remarkable changes.

The health situation in the ESCAP region is diverse and changing and therefore requires interventions that meet the unique needs of the region. Faced with difficult choices in prioritizing investment in health interventions, ESCAP policymakers can benefit from the work of the new Disease Control Priorities Projects. According to general recommendation and agenda setting which are offered by ESCAP Secretariat, Governments should link strategies to improve health and vital registration data with strategies to extend maternal and child health services.Also,Governments need to strengthen immunization programmes, and antenatal and post-natal care as an immediate action to reduce under-five mortality.These programmes have been found to be cost-effective in many countries. The future of health indicators in the ESCAP region will remain a challenging and increasingly important tasks in the coming decades.

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