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Letter to the Editor

Assessing the Trend of Infertility Rate in 198 Countries and Territories in Last Decades

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Dear Editor-in-Chief

Infertility rates were reported different in developed regions in comparison with non-developed ones. The prevalence rate of infertility has been reported to elevate from 3.5% to 16.7% in more developed nations and from 6.9% to 9.3% in less-developed ones (1). In the various continents, there is no single epidemic of infertility rates (2). Therefore, it is necessary to investigate every continent separately and determine clusters of countries with similar trends.

Data for prevalence rates of infertility during 1990-2015 (in 5-year intervals; data for next 5 years is not yet available) in 198 country and regions were derived from Global Burden of Diseases (GBD) study (5). The trend of infertility rate was estimated, separately for males and females in six regions and also among developing and developed countries. Then all countries were classified into subgroups with similar trends over the years.

Table 1 shows the mean ± SD of infertility rate as well as Latent Growth model (LGM) results. The intercepts represent the estimated overall mean of initial infertility rate. A positive and negative slope reveal that the rate had an incremental and decremental trend over the period, respectively. For interpretation of results, the estimates for Asian male (intercept=684, slope=22.25) reveals that the initial rate of infertility in this region has been 684 per 100000 in 1990 and it has an incremental trend with a slope of 22.25 until 2015. The highest and the lowest increase in the male infertility has been estimated in Asia (rate of 22.5) and Australia & Oceania (rate of 5.56). Moreover, female infertility in Asia and North American has the highest and the lowest increase rate of 10.18 vs 5.89, respectively. However, female in developed countries had a decremental trend of -2, the others in developing and developed countries showed an incremental trend.

The results of fitting the Growth mixture models (GMM) showed that most countries were classified into classes with the incremental trends, the infertility rates decreased in some clusters, including Cameroon, Niger (male) and Barbados, Guyana, Mozambique, Pakistan and Virgin Islands (female). The maps in Fig. 1 reveals the clusters of countries with estimated similar trend of infertility rates from 1990 up to 2015.

Table 1: Infertility rates (per 100,000) as mean ± SD and estimates from the LGM by the regions for analysis of trends

Region	*Gender*	*Years*						*LGM estimates*	
		1990	1995	2000	2005	2010	2015	Intercept	Slope
Asia	Male	684±251	710.3±273.1	721.5±281	751.9±307.7	804.2±356.8	780.1±309.8	684	22.25
	Female	530.3±328.2	514.7±338.4	499.2±319.9	497.5±302.1	550.1±351.9	587.2±379.2	509.07	10.18
Africa	Male	941.1±476.5	933±458.7	933.4±489.2	954±510	970.1±502.5	1005.8±497	922.10	12.56
	Female	315.2±305.1	277.5±299.9	262.9±325.9	281.4±352.3	310.7±382.1	318.2±363.4	283.49	6.05
Europe	Male	626.8±246.8	630.9±243.3	654.2±276.9	670.1±285.6	670.6±292.1	613±287.45	628.77	10.41
	Female	556.1±418.1	535±426.8	568.5±480.4	571.4±462.4	549.5±437.4	567.4±433.8	553.07	-2.075
North America	Male	733.5±295.8	767±327.5	786.8±343.8	805.5±357.1	814.3±341.4	778.7±298	750.88	16.33
	Female	1506.3±735.7	1573.7±801.5	1580.5±815	1582±817.7	1572.8±769.9	1627.8±758.4	1563.25	5.89
South America	Male	493.8±316.4	486.1±328.1	517.7±352.9	526.2±290.1	533.4±265.8	533.6±275	482.67	14.04
	Female	876.8±954.4	817.8±956.2	888±1030.2	859.9±818.2	854.4±742	907±776.4	835.9	6.35
Australia& Oceania	Male	867.2±332.1	884.6±324.8	893.8±318.4	906.1±319.7	909.6±319.6	907.2±327.2	872.94	5.56
	Female	917.9±391.4	928±397.3	941.7±361.3	934.3±409.7	952.7±424.7	876±392.4	921.21	6.27
Developing Countries	Male	769±231.4	772.2±367.8	784.1±390.1	807.4±399.5	831.2±394.7	843.1±393.8	757.1	17.5
	Female	589±578.3	569.5±604	569.7±636.2	577.5±611.9	610.5±611.2	631±614.9	565	11.4
Developed Countries	Male	698±329.3	724.7±347	741±350	755.5±369.7	764.9±401.6	696.9±364.8	708.3	15
	Female	807.3±617.9	810.9±659.2	829.8±654.6	819.6±649.5	797.6±621.9	817.1±633	817.4	-1.8

Conflict of interest

The authors declare that there is no conflict of interests.

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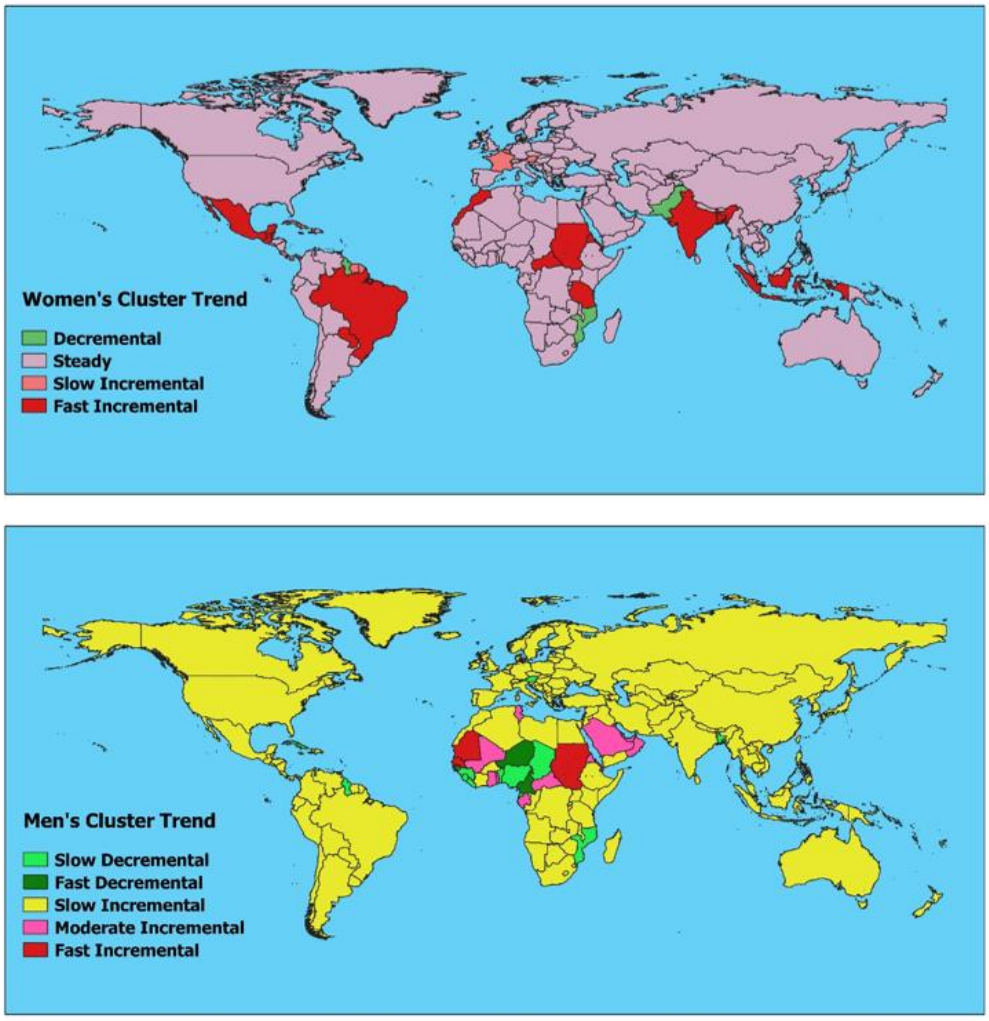

Fig. 1: World's cluster map based on female (up) and male (down) infertility outbreak trends within past decades