INVITED COMMENTARY

Secular Trends in Birthweight

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ecular trends in birth weight have been reported over a wide range of time periods, some dating back to as early as the initial years of the 20th century or even earlier [1,2]. However, changes in demographic profile, socio-economic status, environ-mental conditions, disasters, medical interventions, and health systems are expected to have an impact on these secular trends. Most of the reports on secular changes in birth weight (as also other anthropometric profiles such as length and head circumference) have largely come from Europe or North America; very few from low-and-middle-income countries (LMIC). The article in this issue of the Indian Pediatrics [3], which presents changes in birth weight from a tertiary care hospital in North India over a 40-year period may be a useful addition to information from LMICs. Most of the published data on secular trends span the period 1950 to 2010; large proportion being population based in comparison to hospital-based reports.

Celind, et al. [4] reported secular trends in birth weight amongst boys from 1950-2010 from Sweden which comprised a cohort of 46,548 boys. While the analysis for the entire period was noted to be stable (only a minimal negative secular trend was noted: -0.4 g/year; P<0.01), distinct trends were noted during sub-periods: a decrease during 1950-1980, an increase during 1980-2000 and again a decrease from 2000-2010. Domagala, et al. [5] reporting on 7510 neonates born in the Polish City of Wroclaw between 1950s-2000 observed a minimal but insignificant increase in birth weight. They too observed periods of increase and decrease in the trends of birth weight over specific time periods; particularly notable being the deceleration in 1970s and 1980s which corresponded with the economic crisis and political transformations in Poland. Similar observations have been reported from Japan. Oishi, et al. [6] reported on birth weights of 6563 term singleton neonates born between 1962-1988 in a Municipal maternity hospital in Nagasaki prefecture. They observed an increase in size at birth from 1960s to 70s but not thereafter, which the authors attributed partly to the improved socio-economic status of the population. In contrast population-based studies from Japan using national birth data between 1979-2010 reported a decline in birth weight (from 3200g in 1979 to 3020 g in 2009) and increase in prevalence of low birth weight and preterm birth amongst singleton births [7,8]. During the same period an increase in maternal height was also reported [8]. Takemoto, et al. [8] suggested that this deceleration in birth weight may have been related to changing nutritio-nal status of Japanese women, recommendations to limit weight gain in pregnancy and an increase in preterm deliveries. da Silva, et al. [9] reported on the changes in birth weight of term singleton newborns born in Brazil from 1978 to 2010 (32,147 newborns from three population-based cohorts). Between 1978-1994 there was a reduction in birth weight which ranged from -27.7g to -89.1g. From 1994-2010 there was an increase in birth weight that ranged from +24.7g to +30.2g. The changing trends were attributable to differing reasons in each of the cohorts at different time periods, indicating lack of common pattern even within a country at similar time periods [9]. These large datasets from the more affluent nations show that there has been no consistent pattern in secular birth weight trends over the past five to six decades.

More recently declining birth weight trends have been reported from North America. The US data for 2008 as compared to 1990 indicated that there was a decline in macrosomia (>5000g) and a 17% increase in low birth weight (including small for gestation (SGA) [10]. It has been suggested that part of this could be explained by obstetric interventions terminating pregnancy earlier at lower gestation. It has also been suggested that fetal growth was declining independent of gestational age, reasons for which were not entirely clear. Using Canadian Vital Statistics - Birth database, Adam, et al. [11] observed that amongst 5,941,820 singleton live births in Canada, there was a decline in birth weight between 2000 (mean birth weight 3442 g) and 2016 (mean birth weight 3367 g), while SGA births increased from 7.2% to 8.0%. An adjusted multivariate analysis suggested that the increased odds of SGA birth could partly be explained by factors such as births to parents born outside of Canada, unmarried women, older women, nulliparous women, and women residing in low-income neighborhoods. Similar findings have been reported from LMICs too. Declining birth weight trends have also been reported from Iran [12]. A meta-analysis of births between 1971 and 2010 in Iran noted that from 2000 onwards there was a significant

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negative secular trend in birth weight (approximately -8.1g/y) [12]. Similar findings have been reported from Argentina for births between 1992-2002 [13]. A study published from Vietnam using surveillance data showed no change in birth weight between 2005-2012 [14].

In contrast, there are reports that document a secular increase in birth weight. A single center data from Israel documented an increase in birth weight amongst all the 32,062 births in the health facility over the entire time span [15]. This was attributed to a decrease in the number of preterm births. However, when the data for term babies was analyzed, they showed no change in birth weight, while length and head circumference showed a significant increase. Similar trends in hospital derived data have also been reported from other countries [16], including India. Thomas, et al. [3] noted an increase of 100-200g in all live born neonates in 2009-2016 compared to those born in 1971-73 at a single center in North India. Paradoxically, this increase was observed despite an increase in the prevalence of SGA (9.8% vs 4.7%) and preterm babies (16.6% vs 8.0%), and a decrease in the proportion of larger babies (unlike the inverse association between mean birth weight and proportion of SGA/LBW/preterm reported in other large population-based studies). The authors have offered no explanation for this paradox. Similar trends of increase in birth weight spanning about 10-20 years have been reported both from hospital [17], and from population based demographic surveillance system in India [18].

However, it is important to note that even within the same geographic region ethnicity may influence the trends in birth weight. Lahmann, et al. [19] analyzed the Queensland Perinatal dataset for singleton births during 1988-2005. While the annual increment in birth weight over this period was about +1.9 g/yr, the change observed was confined to only the non-indigenous newborns.

Mere improvement in socioeconomic status of a region does not ensure an increase in birth weight over time. It would be important to be cognizant of other influencers such as demographic and ethnic character-istics, maternal nutrition and life style, environmental factors and disasters, and most importantly medical interventions especially early termination of pregnancies by the obstetricians. Combination of sociopolitical and economic factors coupled with demographic factors influence these trends, making predictions of change over time rather challenging. One needs to be cautious while interpreting secular trends from hospital data which are fraught with several pitfalls, most important amongst them being selection bias which could change substantially over time. Tracking secular trends from population-based data offer useful information for influencing policy, especially when adjusted for a variety of factors that are known to influence fetal growth and birth weight.

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