

An edited version of this article was used as the basis for the feature article: **Weathering the storm: forecasting birth in turbulent times. Midwifery magazine 2012: 15(issue 2)**

Weathering the storm: forecasting births in turbulent times

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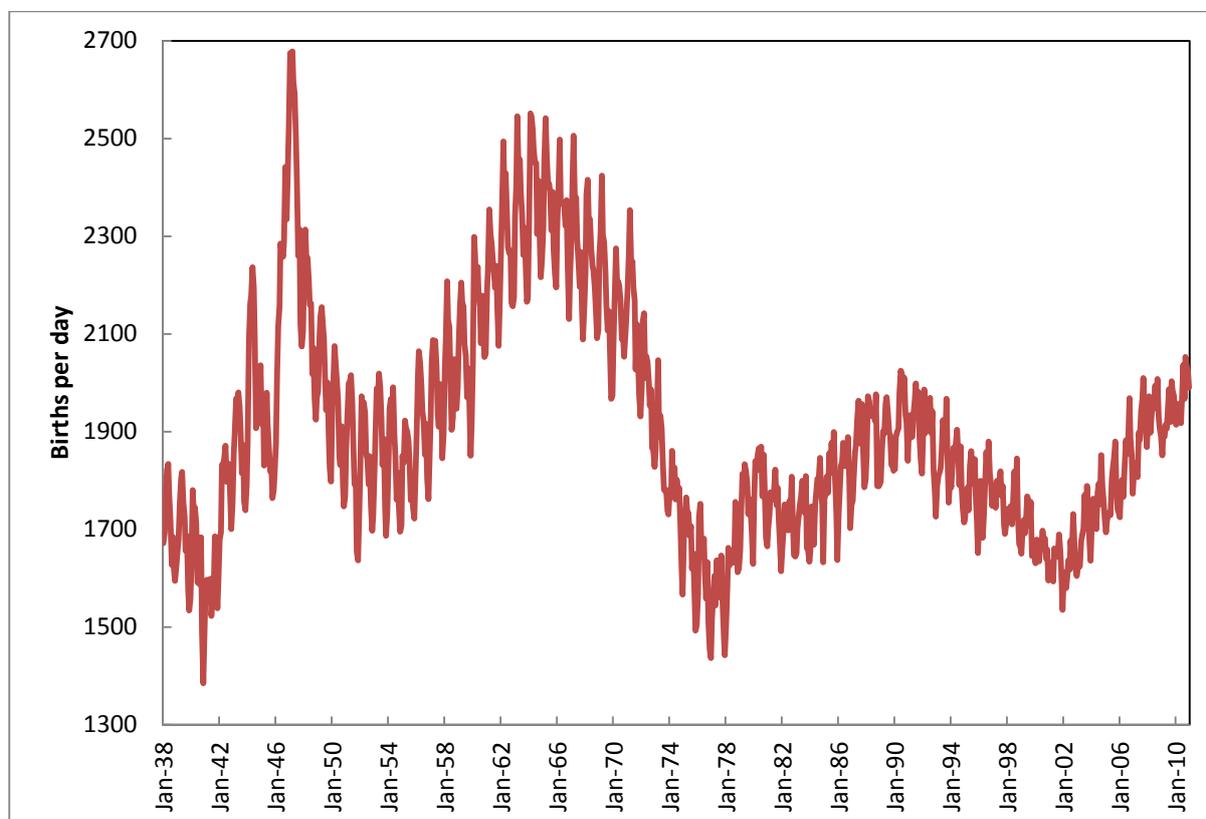
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All are aware of the recent 'unexpected' increase in births and the ensuing pressures on obstetric departments and staff workload. This in turn leads to a consideration of the predictability or otherwise of the number of births and hence of workforce planning.

Figure 1 gives a highly informative view of monthly births in England & Wales from 1938 to 2010. To understand what is happening regarding births in 2011 all concerned need to understand what all the peaks and troughs mean.

Figure 1: Births per day (monthly) from 1938 to present



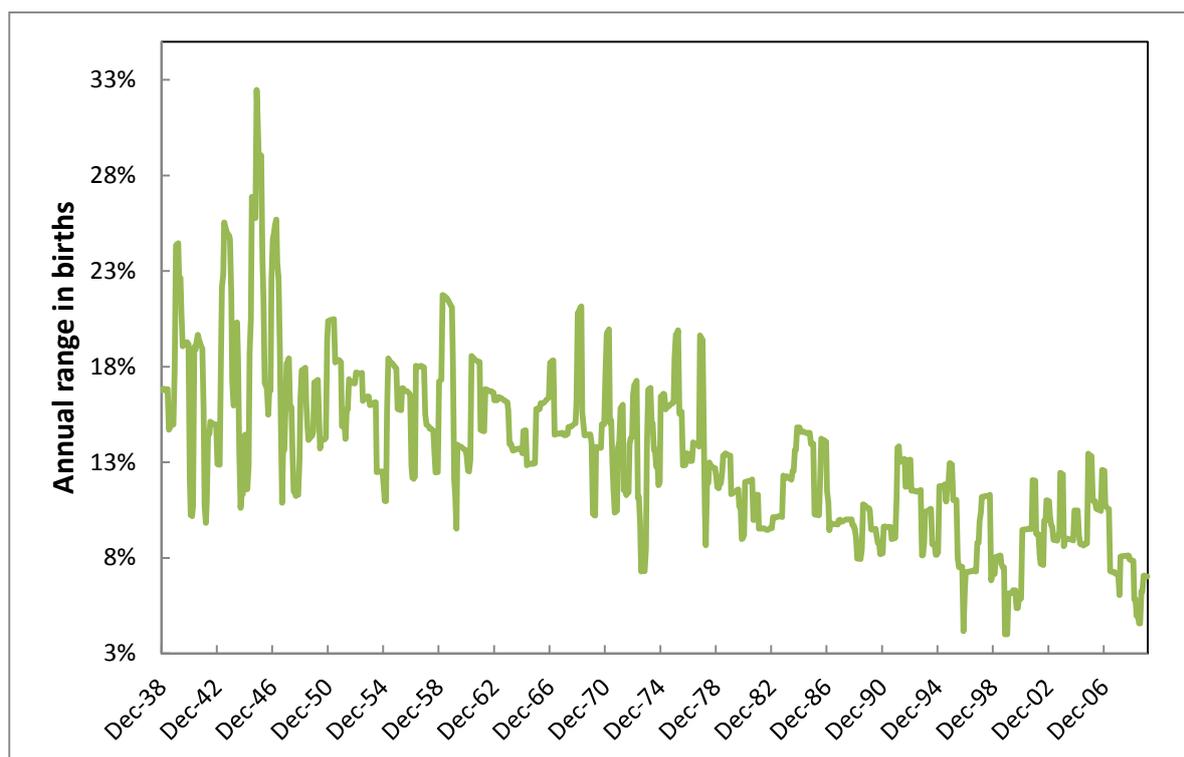
Data kindly provided by the UK Office of National Statistics.

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First is the big spike occurring after the end of World War II – the post war baby boom. These post war baby boomers are now all in their late 60's and creating a set of cost pressures relating to end-of-life care. But that is another story. However before the baby boom there was a trough during the war for obvious reasons. Hence very few babies born in November 1940 and 80% more born in March 1947 and depending on when these babies in turn grow to become women and choose to have their first and subsequent babies then sets up a repeating cycle.

The distance between the peaks is roughly set by the average age at which women choose to have their children and the width of the peaks is roughly determined by the average number of children per mother. Obviously this main cycle applies to white British families and additional mini-cycles will commence during times of influx of immigrants. However the key point is that these cycles lead to periods of higher and lower demand for maternity beds and midwives.

Figure 2: Seasonal nature of births



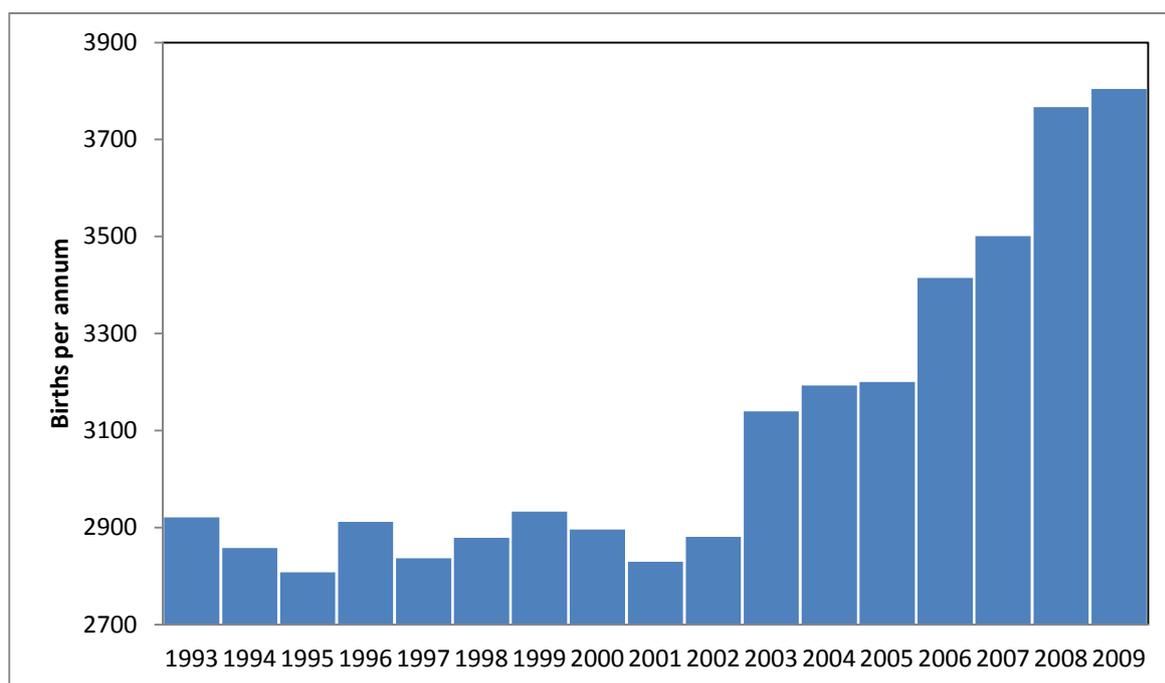
Footnote: Extent of seasonality has been determined as the difference between the maximum and minimum births over a 12 month period divided by the average births in that period.

However in addition to the bigger cycles there is a smaller annual cycle relating to a seasonal pattern in births. In this seasonal pattern the month with the minimum number of births per day typically occurred in November up to around 1970, November/December to the mid-1980's, December to the early 2000's and moving to around January up to the

present. Seasonal patterns in births have been an intriguing area of research and arise from a mixture of cultural, holiday, seasonal (temperature and light intensity), social changes and the shift from an agricultural to an industrial economy (Friger et al 2009, Doblhammer et al 2000, Bonnelykke et al 1987) and a similar shift regarding the months for minimum and maximum births to that observed in England has also been reported in Scotland (Russell et al 1993).

The size of the gap between the months having the most and least births is also important for resource planning, i.e. more beds and midwives, and hence Figure 2 shows that the gap between the seasonal maximum and minimum has declined over time. This decline mostly occurred from around 1970's onward and may be related to the wider availability of contraceptives, i.e. births are becoming less seasonal as time progresses and from a planning perspective this makes the allocation of beds and staff across the year an easier matter. It would seem that planning of midwifery services is very much a case of following the long term trends; however, we need to go back to the larger peaks and troughs to understand what went wrong from 2002 onward.

Figure 3: Trend in births for Milton Keynes



Data kindly provided at local authority level by ONS.

As already discussed the longer-term pattern in births originates from the World War II baby boom. If we look at the time from the trough to the peak we see that it was 6 years (Jul-41 to Mar-47), 10 years (Dec-54 to Dec-64) and 14 years (Nov-76 to Feb-91) and presumably will be greater than 14 years from the trough reached in June 2002. Hence the current cycle of high births could continue to somewhere around 2016 before heading into the downward

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part of the cycle. Basic message here is that current pressures could continue for at least another four years plus a few more years on the other side of the peak.

As mentioned earlier the reason that the peaks are becoming broader is related to the continual upward trend in average age of the mother at first birth which is an international trend (see <http://www.cdc.gov/nchs/data/databriefs/db21.htm>), i.e. we have a wider range around the average in the age at first birth. This also partly extends the time between the peaks. For example, if 18 was the average age for first birth then the peaks would remain roughly 18 years apart. This is then further modified by the average number of births per mother, i.e. more births per mother gives a broader peak, etc.

If there is an ongoing trend to inward immigration then the trend will be tilted upward as younger immigrants arrive over time and then have babies. An excellent example of this effect can be seen in the birth data for Milton Keynes which was established as a 'new town' in 1967 and has experienced continuous inward immigration from that point onward to fill an expanding number of new build homes. As can be seen in Fig 3 the downward part of the cycle from 1990 to 2002 (as seen in Fig 1) has been tilted upward by the steady influx of young women (and men) and the increase from 2002 onward has been correspondingly accentuated. It is suggested that from around 2016 onward Milton Keynes will then resume somewhat stationary level of births rather than the downward cycle which will occur in other areas.

How do we equate this with our current dilemma and the influx of immigrants associated with the European Union which commenced in 2004? Several points need to be made here. Firstly, the pattern seen in Figure 1 will largely apply across locations in the UK which are predominantly 'white British'. Several waves of immigration commenced in the early 1960's from the Caribbean and the Indian subcontinent and these will modify the situation in those locations most effected, i.e. the Milton Keynes effect. These new arrivals firstly settled in London and then radiated outward over time. In general, Asian women tend to give birth at an earlier age than European and black mothers and these observations should be confirmed using local data. Forecasts at a local level will therefore need to be sensitive to these factors and long term trends at both Local Authority and small area level can be obtained from the Office of National Statistics (ONS) or via the Public health team at the local PCT. However, it is important to point out that the influx from the Accession Eight countries which commenced in 2004 only added to the upward cycle which had already commenced from mid-2002. It is not the immigrants which caused the problem; it was WWII, the surge in immigration from Eastern Europe just happened to occur at the 'wrong' time.

So how did we get the resource planning totally wrong? Most attempts to forecast births usually get bogged down in arguments around demographic forecasts based on age bands

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and trends in fertility rates – hence a fog of confusion leading to inaction. This article has sought to show that simply plotting the data for your local area going back to the early 1970's will usually be sufficient to give a workable time trend from which to base a forecast. On this occasion everyone seems to have missed the obvious by attempting complex but misleading analysis in the absence of the long term view. The current purchaser provider split and devolution of planning to local level probably added to the general confusion.

Our final issue is that of workforce planning. The broad cycles initiated post WWII will continue to dominate the future trends at a national level especially in localities which are predominantly white British. Hence a cycle of midwife training should commence somewhere around 2023'ish (with advice from the ONS regarding any new developments in the average age of mothers and births per mother). To complicate the issue Foundation Trusts have no obligation to hire newly trained midwives (or equivalents) and generally have no capacity and staffing standards other than to deliver a reasonably safe service at minimum cost. It would seem that some absolute standards need to be introduced to keep the supply of midwives match with their demand. One example of an absolute standard is a safe occupancy level for obstetric beds (Jones 2012). Hopefully all concerned will have learned some useful lessons.

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