

## CONCLUSION

Women treated for cervical intraepithelial neoplasia grade 3 are at increased risk of developing invasive cancer in the remaining cervix or vagina. This risk has increased with changes in treatment modalities since the 1990s compared with treatment in the 1960s, is higher for women who are older ( $\geq 50$  years) at treatment, and remains increased 20 or more years after treatment compared with the general population. The question on how follow-up should be carried out is not resolved but this study implies that it has been insufficient. We should at least offer treated women cytological smears at regular intervals, preferably for at least 25 years, independent of age.

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## Child wellbeing and income inequality in rich societies: ecological cross sectional study

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### EDITORIAL by Black and Jeffery

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### ABSTRACT

**Objectives** To examine associations between child wellbeing and material living standards (average income), the scale of differentiation in social status (income inequality), and social exclusion (children in relative poverty) in rich developed societies.

**Design** Ecological, cross sectional studies.

**Setting** Cross national comparisons of 23 rich countries; cross state comparisons within the United States.

**Population** Children and young people.

**Main outcome measures** The Unicef index of child wellbeing and its components for rich countries; eight comparable measures for the US states and District of Columbia (teenage births, juvenile homicides, infant mortality, low birth weight, educational performance, dropping out of high school, overweight, mental health problems).

**Results** The overall index of child wellbeing was negatively correlated with income inequality ( $r=-0.64$ ,  $P=0.001$ ) and the percentage of children in relative poverty ( $r=-0.67$ ,  $P=0.001$ ) but not with average income

( $r=0.15$ ,  $P=0.50$ ). Many more indicators of child wellbeing were associated with income inequality or children in relative poverty, or both, than with average incomes. Among the US states and District of Columbia all indicators were significantly worse in more unequal states. Only teenage birth rates and the proportion of children dropping out of high school were lower in richer states.

**Conclusions** Improvements in child wellbeing in rich societies may depend more on reductions in inequality than on further economic growth.

### INTRODUCTION

A recent Unicef report, which assembled 40 indicators of child wellbeing in rich countries, concluded that children in Britain and the United States fared less well than in any of the other 21 countries included in its analysis.<sup>1</sup> Measures of child wellbeing are associated with socioeconomic status.<sup>2</sup> Ill health and social problems associated with low socioeconomic status tend to be more common in societies with bigger differences in income



Correlation between income inequality and the Unicef index of child wellbeing in 23 rich countries

between rich and poor.<sup>34</sup> In a recent study we found that it was those age and cause specific death rates with steeper social gradients that tended to be higher in more unequal societies.<sup>5</sup> If, as Marmot has suggested,<sup>6</sup> social gradients in health in rich countries reflect social position, and more unequal societies have worse health, then perhaps differences in social status are exacerbated in societies with wider differences in income.

The indicators of child wellbeing used in the Unicef report are ecological measures for whole countries. As the report does not attempt to explain the national differences in child wellbeing it described, we decided to see how they were related to three macro-economic measures: material living standards (average income, as measured by gross national income per capita), the scale of differentiation in social status (as measured by income inequality), and social exclusion among families with children (as measured by the proportion of children living in relative poverty). We also analysed indicators of child wellbeing among the 50 states of the US.

## METHODS

### International comparisons

We used the Unicef index, which was developed as part of a 2007 review of child wellbeing in rich countries.<sup>17</sup> It combined 40 items of the index into six main dimensions: material wellbeing, health and safety, educational wellbeing, family and peer relationships, behaviours and risks, subjective wellbeing. More details are on [bmj.com](http://bmj.com).

The Unicef index contains items that are determinants and aspects of child wellbeing. As we wanted to see how wellbeing might be determined by the proportion of children living in relative poverty, it was necessary to remove the relative poverty item and recalculate the index.

### Country comparisons

Income inequality data came from the United Nations development programme human development indicators, 2003-6. Income inequality was measured as the ratio of the total annual household income received by the richest 20% of the population to that received by the poorest 20%. This ratio ranged from 3.4 in Japan, the most equal country, to 8.55 in the US, the most unequal.

Child relative poverty was measured as the percentage of children aged 0-17 years in households with an income equivalent to less than 50% of the national median. Data within the period 1999-2001 came from the OECD.<sup>7</sup> As expected, income inequality and child relative poverty were positively correlated for our 23 countries ( $r=0.72$ ,  $P=0.0002$ ), indicating that they share about half (52%) of their variance.

Average income was measured as gross national income per capita at 2003 purchasing power parities in US dollars and obtained from the World Bank world development indicators database.<sup>8</sup>

### Statistical methods

We estimated Pearson's correlations to see how the index of child wellbeing and its six dimensions and 39 indicators were related to income inequality, the percentage of children in relative poverty, and average income.

### US comparisons

We tabulated associations among the 50 US states (and the District of Columbia) of eight indicators of child wellbeing. We examined previously published associations with teenage births, juvenile homicides, educational performance, and rates of high school drop out.<sup>4,9-11</sup> We also conducted four new analyses: firstly, we replicated previous findings for infant mortality and low birth weight so that we could present them in a form consistent with the other outcomes, and then we analysed the proportion of children who are overweight and rates of child mental health problems.

As a measure of income inequality for the US, we use the Gini coefficient of the inequality of household incomes in 1999 provided by the US Census Bureau.<sup>12</sup> Average income, measured as per capita income in 1999, was also obtained from the US Census Bureau.<sup>13</sup> Data on child relative poverty are not available for all states, so our US comparisons are restricted to income inequality and average income.

Data on infant mortality<sup>14</sup> and low birth weight<sup>15</sup> for 2002 came from the US National Centre for Health Statistics. Data on the proportion of overweight children and the proportion of children with moderate or severe difficulties in the area of emotions, concentration, behaviour, or getting along with others were obtained from the 2003 US National Survey of Children's Health.<sup>16</sup>

## RESULTS

The overall index of child wellbeing was closely and negatively correlated with income inequality ( $r=-0.64$ ,  $P=0.001$ ) (figure) and children in relative poverty ( $r=-0.67$ ,  $P=0.001$ ) but not with average income ( $r=0.15$ ,  $P=0.50$ ). Adjustment for income inequality or child relative poverty did not change the lack of association between child wellbeing and average income in rich countries.

The table shows the correlations between income inequality, children in relative poverty, and average income on one hand and the six dimensions and 39 items of the Unicef index on the other.

## Structure of the Unicef index of child wellbeing and correlations of six main dimensions and 39 items with income inequality, child relative poverty, and average income\*

	Income inequality		Child relative poverty		Average income	
	r	P value	r	P value	r	P value
Overall Unicef index	-0.64	0.001	-0.67	0.001	0.15	0.50
<b>Material wellbeing</b>						
Overall	-0.36	0.10	-0.37	0.10	0.40	0.06
Deprivation:						
Low affluence (child's own report)	-0.41	0.08	-0.40	0.11	0.80	<0.001
Few educational possessions (desk, computer, textbooks etc)	0.00	0.99	-0.26	0.25	0.29	0.19
Few books	-0.37	0.08	-0.34	0.14	-0.08	0.72
Work:						
No employed parent	-0.23	0.29	0.03	0.88	0.04	0.87
<b>Health and safety</b>						
Overall	-0.53	<0.01	-0.71	<0.001	0.16	0.45
Health at birth:						
Infant mortality	-0.76	<0.001	-0.66	<0.001	-0.13	0.55
Low birth weight	-0.42	0.048	-0.62	0.003	0.25	0.26
Immunisations:						
Measles	-0.11	0.60	-0.06	0.80	-0.26	0.22
Diphtheria-pertussis-tetanus (DPT)	-0.04	0.86	-0.32	0.16	-0.13	0.56
Polio	-0.05	0.82	-0.49	0.02	-0.06	0.79
Child mortality:						
Accident/injury mortality	-0.27	0.21	-0.40	0.08	0.38	0.08
<b>Educational wellbeing</b>						
Overall	-0.41	0.06	-0.55	0.01	0.48	0.02
Achievement:						
Maths scores	-0.50	0.03	-0.41	0.07	0.32	0.17
Reading scores	-0.25	0.28	-0.29	0.21	0.23	0.34
Science scores	-0.36	0.11	-0.13	0.57	0.09	0.69
Participation:						
Further education	-0.67	<0.001	-0.66	0.002	0.46	0.04
Aspirations:						
Aspiring to low skilled work	0.46	0.04	0.19	0.40	-0.14	0.55
Not in education, employment, or training	0.32	0.18	0.28	0.24	0.10	0.10
<b>Peer and family relationships</b>						
Overall	-0.37	0.08	-0.26	0.25	-0.19	0.39
Family structure:						
Single parent households	0.01	0.96	0.10	0.68	-0.68	<0.001
Step-parent households	0.08	0.73	0.23	0.35	-0.65	0.002
Family relations:						
Eat together regularly	-0.22	0.32	-0.22	0.34	0.35	0.11
Child talks to parents	0.10	0.68	0.00	0.99	0.01	0.97
Peer relations:						
"Peers are kind"	-0.50	0.02	-0.54	0.02	0.01	0.95
<b>Behaviours and risk</b>						
Overall	-0.58	0.004	-0.33	0.14	-0.10	0.69
Risk behaviour:						
Smoke cigarettes at least once a week	0.11	0.64	-0.10	0.72	-0.08	0.72
Been drunk twice or more	0.23	0.33	0.17	0.50	0.13	0.59
Cannabis in past year	-0.29	0.22	-0.36	0.15	0.41	0.08
Teenage birth rate	-0.74	<0.001	-0.65	0.001	0.03	0.89
Had sex by age 15 years	-0.04	0.88	0.06	0.84	0.19	0.49
Condoms used during last sexual intercourse	0.33	0.23	0.45	0.12	0.23	0.41
Experiences of violence:						
Involved in fighting	-0.20	0.39	-0.32	0.20	-0.21	0.36
Victim of bullying	-0.47	0.04	-0.28	0.27	0.09	0.69

	Income inequality		Child relative poverty		Average income	
	<i>r</i>	P value	<i>r</i>	P value	<i>r</i>	P value
<b>Health behaviour:</b>						
Eat fruit daily	0.37	0.10	0.36	0.14	0.60	0.005
Eat breakfast on school days	-0.22	0.34	-0.42	0.08	-0.17	0.48
Average days physically active in past week	0.12	0.62	-0.45	0.06	-0.23	0.34
Overweight	-0.56	0.01	-0.72	<0.001	0.08	0.72
<b>Subjective wellbeing</b>						
Overall	-0.04	0.84	-0.27	0.23	-0.31	0.15
<b>Health:</b>						
Self rated fair/poor health	-0.32	0.19	-0.27	0.30	-0.38	0.11
<b>Personal wellbeing:</b>						
Life satisfaction above median	-0.35	0.13	-0.32	0.20	-0.13	0.57
Feel like an outsider	-0.11	0.64	-0.04	0.85	-0.23	0.30
Feel awkward	0.28	0.22	0.01	0.94	-0.21	0.35
Feel lonely	0.45	0.04	-0.13	0.58	-0.17	0.46
<b>School wellbeing:</b>						
"Likes school a lot"	0.07	0.77	0.04	0.87	0.00	0.99

\*Where necessary, items have been reverse scored so that lower scores indicate worse outcomes throughout table.

#### Associations with income inequality

Among the main Unicef dimensions of child wellbeing, health and safety and behaviours and risks were significantly worse in more unequal countries. Infant mortality and rates of low birth weight were higher in countries with higher levels of income inequality, as were rates of teenage pregnancy, rates of overweight children, and the proportion of children who reported having been bullied. Items in other dimensions of wellbeing that were also related to income inequality included lower maths scores, a lower proportion of young people in further education, and a lower proportion of children who find that their "peers are kind."

There was a significant relation between lower levels of income inequality and a higher proportion of children feeling lonely. Children in countries with lower levels of income inequality were more likely to aspire to less skilled work.

#### Associations with percentage of children in relative poverty

Health and safety and educational wellbeing were the main Unicef dimensions of child wellbeing that were significantly worse in countries with higher levels of children in relative poverty. Infant mortality and rates of low birth weight were higher in countries with more children in relative poverty, and rates of immunisation for polio were significantly lower. In such countries fewer young people participated in further education, fewer reported that "peers are kind," teenage birth rates were higher, and a higher proportion were overweight.

#### Associations with average income

Educational wellbeing (but not achievement) was better in countries with higher average incomes. In richer countries, fewer children reported low levels of family affluence, more young people participated in further education, and lower proportions of children were living

in single parent or step-parent families. The only other significant association with average income was that children in richer countries were more likely to report eating fruit daily.

#### Results among states of the US

Results for the US from previously published studies and our new analyses are presented in full on [bmj.com](http://bmj.com). Income inequality at the state level was significantly correlated with rates of teenage births, juvenile homicides, infant mortality, low birth weight, child overweight, mental health problems, and high school dropouts as well as with worse educational scores. States with higher average incomes had significantly fewer teenage births and fewer children dropping out of high school, but they did no better than poorer states on the other six measures of child wellbeing.

#### DISCUSSION

Among the components of the Unicef index, higher levels of one or other of our inequality measures were significantly associated with worse outcomes for infant mortality, low birth weight, polio immunisation, average maths scores, the proportion of teenagers in further education, fewer children saying their peers are kind, teenage birth rates, experience of bullying, and childhood overweight. On the other hand, in more unequal countries fewer children reported feeling lonely, and fewer had low job aspirations. The first of these is entirely driven by Japan, an outlier, with a score more than 4 SD from the mean. The second is a more robust tendency for job aspirations to be lower in more equal countries. But rather than being realistic aspirations, this may simply reflect a stronger tendency for children in more unequal countries to aspire to unattainable money and fame. We found a non-significant tendency for aspirations to be highest where educational achievements were lowest ( $r=-0.36$ ;  $P=0.12$ ). In addition, there is

## WHAT IS ALREADY KNOWN ON THIS TOPIC

A recent Unicef report measuring child wellbeing in rich countries puts the UK at the bottom

## WHAT THIS STUDY ADDS

The Unicef index of wellbeing is strongly associated with income inequality and with the proportion of children living on less than half the median income in each country but not with gross national income per capita

Similar associations were found with eight indicators of child wellbeing in the 50 states of the US

Young people are aware of status differentiation

Attempts to reduce inequality and the proportion of children living in relative poverty are urgently required

some evidence that social mobility is lower in more unequal countries.<sup>4</sup>

Our examination of indicators of child wellbeing among the US states largely confirmed these patterns. Outcomes on all of our indicators were significantly worse in more unequal states. In contrast, higher average income was significantly (and independently) related to lower teenage birth rates and to a lower proportion of children dropping out of high school.

Of the indicators of child wellbeing included in the Unicef index, the one most closely related to the overall index is the teenage birth rate, which has been called an “iconic” variable for this reason.<sup>17</sup> It is also the indicator most closely related to inequality—internationally and among the US states.

Despite large differences in living standards, few measures of child wellbeing were related to average income in either the international or the US settings. Previous studies have shown that although health remains related to income within rich countries (as health inequalities testify), it is no longer related to average differences in income between them.<sup>18 19</sup> This is consistent with the view that what matters within rich countries may no longer be absolute material standards, but income (or social position) relative to others in the same society. However, when international analyses include data for poorer countries, it is clear that among them, absolute material standards remain important for child wellbeing.<sup>17</sup>

## Potential confounders

We are sometimes asked about a possible confounding role of ethnic division or migration from poorer countries. Ram, however, used international data to show that income inequality remained significantly related to health even after adjustment for an index of ethnic heterogeneity.<sup>20</sup> In addition, although levels of child wellbeing in Sweden and the US differ so dramatically, both countries have a similar proportion of the population (around 12%) who were born in other countries.<sup>21 22</sup>

The provision of public services might also be a confounder. Healthcare expenditure, however, is not related to mortality in rich countries<sup>23</sup> and an analysis of US data found that expenditure on public services among the 50 states could account for only part of the

relation between income inequality and mortality.<sup>24</sup> Among OECD countries we found that public social expenditure as a percentage of national income only slightly attenuated the relation between income inequality and the Unicef index. For several other outcomes related to inequality—such as obesity, homicide, and levels of trust—it is much less plausible that services might be a powerful determinant.

## The UK

As the figure shows, the UK has the lowest score for child wellbeing on the Unicef index and does worse than expected—even given its high levels of inequality and child relative poverty. Its position reflects poor scores on most components of the index. Only on mortality from accidents and injury does the UK do conspicuously well. On the proportion of children who find their peers kind and helpful, the frequency of drunkenness, and the proportion of children who had sex by age 15, Britain does worse than expected from its levels of child relative poverty and inequality.

Our finding that measures of child wellbeing are related to income inequality internationally among rich countries is supported by similar associations with child outcomes among the 50 states of the US. While our results have the usual limitations of cross sectional analyses, they cannot easily be attributed to confounding. Improvements in child wellbeing in rich countries might depend more on reductions in inequality than on further economic growth, and attempts to reduce the proportion of children in relative poverty are urgently required.

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## Correlations among measures of quality in HIV care in the United States: cross sectional study

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### ABSTRACT

**Objective** To determine whether a selected set of indicators can represent a single overall quality construct.

**Design** Cross sectional study of data abstracted during an evaluation of an initiative to improve quality of care for people with HIV.

**Setting** 69 sites in 30 states.

**Data sources** Medical records of 9020 patients.

**Main outcome measures** Adjusted performance rates at site level for eight measures of quality of care specific to HIV and a site level summary performance score (the number of measures for which the site was in the top quarter of the distribution).

**Results** Of 28 site level correlations between measures, two were greater than 0.40, two were between 0.30 and 0.39, four were between 0.20 and 0.29, and the 20 remaining were all less than 0.20. One site was in the top quarter for seven measures, but no sites were in the top quarter for six or eight of the measures. Across the eight quality measures, sites were in the top quarter no more often than predicted by a chance (binomial) distribution. **Conclusions** The quality suggested by one measured indicator cannot necessarily be generalised to unmeasured indicators, even if this might be expected for clinical or other reasons.

### INTRODUCTION

Publicly reported performance data are increasingly available for health plans, hospitals, nursing homes, and physicians, and many providers are now being rewarded on the basis of measures of quality of care.<sup>1-3</sup> These initiatives generally rely on a small set of measures, usually of processes of care but sometimes of outcomes. Common indicators of performance of

health plans and physicians focus on the provision of preventive services and the management of a small number of chronic conditions, such as diabetes and asthma.

A rationale for using a small subset of quality indicators is the belief that an organisation's performance on unmeasured processes or outcomes will be similar to that on measured ones. An extension of this logic is that monitoring care indicators for a carefully selected set of prevalent and important conditions, such as diabetes, hypertension, and heart attacks, provides valid information about the overall quality of care provided by a physician, medical group, health plan, or hospital.

Several studies have examined the relations among quality measures for various different types of organisations, but few of these studies examined outpatient medical practices. A recent study of 11 outpatient practices that assessed measures of technical clinical quality found no significant correlations between these measures.<sup>4</sup> Other studies that examined hospitals,<sup>5,6</sup> health plans,<sup>7</sup> and communities<sup>8</sup> have found low correlations among quality measures.

Examining correlations of relations among quality indicators is critical for both measurement and improvement of quality. It is important to understand whether it is appropriate to draw conclusions about the overall quality on the basis of a limited set of indicators. In addition, finding strong correlations among quality measures would support the theory that the measures are the output of a single functional system and that efforts to improve quality should focus on characteristics of the system.