Multidimensional (MD) Poverty Measures: Global discussions and trends

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Motivation

• “Human lives are battered and diminished in all kinds of different ways” Amartya Sen

• Voices of the poor

• Consensus about the fact that poverty is MD
  – Less consensus on how to measure it
Why such interest?

This session will briefly introduce some of the reasons that multidimensional measures of poverty (and well-being) are on the upswing.

In addition to the moral or ethical motivations already covered, they can be divided into three types:

1. Technical – it is now possible
2. Policy – countries and institutions realize the value-added
3. Political – there is a demand
1. Relevant Data are Increasing

Developing Country Surveys: DHS, MICS, LSMS, CWIQ

- Countries with national multidimensional survey data
- Countries with at least two multidimensional surveys
- Countries with at least three multidimensional surveys
- Countries with more than three multidimensional surveys
2. Multidimensional Measures are exploding

• Bandura (2006) found that over 50% of composite (multidimensional) indices had been developed since 2001; now is greater.

• Examples: Doing Business Index, Governance, Global Peace Index, Quality of Life Indices, Multidimensional Poverty Indices, SIGI, CGD Index.
# 3. Why Multidimensional Poverty?

## Income poverty is incomplete

<table>
<thead>
<tr>
<th>Mismatches between income poverty and deprivations in education and nutrition.</th>
<th>Education</th>
<th>Nutrition/health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Children</td>
<td>Adults</td>
</tr>
<tr>
<td>deprived in functionings but not income/expenditure</td>
<td><strong>I. Omission</strong> India</td>
<td>53%</td>
</tr>
<tr>
<td></td>
<td>Perú</td>
<td>32%</td>
</tr>
<tr>
<td>income/expenditure poor persons who are not deprived in functionings</td>
<td><strong>II. Excess</strong> India</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>Perú</td>
<td>93%</td>
</tr>
</tbody>
</table>

3. Why Multidimensional Poverty?

Income poverty is incomplete

<table>
<thead>
<tr>
<th></th>
<th>Neither persistently income poor nor deprived</th>
<th>Persistently income poor only</th>
<th>Persistently deprived only</th>
<th>Persistently income poor and deprived</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>82.8</td>
<td>6.9</td>
<td>8.9</td>
<td>1.4</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>78.8</td>
<td>7.1</td>
<td>7.3</td>
<td>6.8</td>
</tr>
<tr>
<td>Belgium</td>
<td>73.0</td>
<td>9.3</td>
<td>8.8</td>
<td>8.9</td>
</tr>
<tr>
<td>France</td>
<td>70.8</td>
<td>11.6</td>
<td>8.5</td>
<td>9.0</td>
</tr>
<tr>
<td>Ireland</td>
<td>64.8</td>
<td>11.4</td>
<td>9.7</td>
<td>14.0</td>
</tr>
<tr>
<td>Italy</td>
<td>68.8</td>
<td>9.2</td>
<td>11.3</td>
<td>10.7</td>
</tr>
<tr>
<td>Greece</td>
<td>68.8</td>
<td>11.2</td>
<td>9.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Spain</td>
<td>72.7</td>
<td>9.2</td>
<td>8.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Portugal</td>
<td>64.5</td>
<td>12.0</td>
<td>11.3</td>
<td>12.2</td>
</tr>
<tr>
<td>All</td>
<td>70.7</td>
<td>10.4</td>
<td>9.2</td>
<td>9.7</td>
</tr>
</tbody>
</table>

Source: Whelan Layte Maitre 2004 Understanding the Mismatch between Income Poverty & Deprivation
In Europe, while 20% of people are persistently income poor, and 20% are persistently materially deprived, ONLY 10% of people are BOTH persistently income poor and materially deprived.

This observation motivated the move in Europe to a multidimensional poverty measure. Income doesn’t tell the full story – even of material deprivation!
3. Why Multidimensional Poverty?
Income poverty is incomplete

Other considerations with income poverty:
• shows some changes with lag; others at once
• does not show how people are poor
• affected by different policies
• measurement error & data collection issues

So need both — income & other dim.
4. Growth? Claims are strong
2008 Growth Commission

“Growth is not an end in itself. But it makes it possible to achieve other important objectives of individuals and societies. It can spare people en masse from poverty and drudgery. Nothing else ever has.”
4. Growth Commission

The Growth Commission 2008 generated a nuanced set of observations on sustained economic growth based on case studies of countries that had 7% growth for over 25 years.

BUT after 25 years of growth:
- In Indonesia, 28% of children under five were still underweight and 42% were stunted
- In Botswana, 30% of the population were malnourished, and the HDI rank was 70 places below the GDP rank.
- In Oman, women earned less than 20% of male earnings.

Conclusion: Sustained growth needs to be pursued alongside multidimensional poverty reduction. All variables need to be on the table, in view, at the same time.
4. Growth? Claims are strong …and debated

François Bourguignon, Agnès Bénassy-Quéré, Stefan Dercon, Antonio Estache, Jan Willem Gunning, Ravi Kanbur, Stephan Klasen, Simon Maxwell, Jean-Philippe Platteau, Amedeo Spadaro

‘The correlation between GDP per capita growth and non-income MDGs is practically zero…’

**India:** strong economic growth since 1980s.

1998-9 NHFS-2: 47% children under 3 were undernourished
2005-6 NHFS-3: 46% were undernourished (wt-age)

“Growth, of course, can be very helpful in achieving development, but this requires active public policies to ensure that the fruits of economic growth are widely shared, and also requires – and this is very important – making good use of the public revenue generated by fast economic growth for social services, especially for public healthcare and public education.”

Dreze and Sen ‘Putting Growth in its Place’ *Outlook*. November 2011
Problem: Despite growth, India has been falling behind all S Asian countries except Pakistan.

Bangladesh: India’s per capita income 60% higher in 1990; 98% higher in 2010. India grew faster too. But during that time period, Bangladesh has surpassed India in all social indicators.

Dreze and Sen ‘Putting Growth in its Place’ Outlook. November 2011
5. So let’s use a dashboard
- to complement income poverty
- to help design growth & policy
5. A Dashboard

Dashboards… suffer because of their **heterogeneity**, at least in the case of very large and eclectic ones, and most **lack** indications about… **hierarchies** amongst the indicators used. Further, as **communications** instruments, one frequent criticism is that they **lack** what has made GDP a success: the **powerful attraction of a single headline figure** allowing simple comparisons of socioeconomic performance...

*Stiglitz-Sen-Fitoussi p.63*

- A dashboard does not show people’s overlaps across dimensions.
- It does not allow ‘freedom’ – voluntarily opting out.
- It does not catalyse expert, political, or public scrutiny and debate on trade-offs, nor encourage transparency about these.
- Measurement conclusions will be vague:

  “Government says Well-being is Higher, Lower, & Unchanged”
5. A Dashboard

Above please find the 72 indicators for the 12 MDGs.

If these were on your dashboard you might crash.

Perhaps make *some* overview indicators that have good properties so *add* rather than lose information?
5. Dashboard Multiplication?

72 indicators (or even 10), broken down by gender by region by ethnicity by disability (or even just region)
6. Associations

So Dashboards may give too much information

Can we just choose one indicator as a proxy of the main social deprivations?
Why look across indicators?
India NFHS data 2005-6

Another example:
These refer to censored headcounts:

How about mortality and 5 yrs schooling? Surely they are highly correlated?
Percentage of people living in a hh where a child has died: 22.55%
Percentage of people living in a hh where no one has 5 yrs schooling: 17.58%

Are they mostly the same people? Less than one-third of the time.
5.75% of people live in hh with both deprivations
11.83% of people have no member with 5 years of schooling only
16.80% of people live in a hh where a child has died only.
65.63% of people do not experience either deprivation.
So let’s use Venn Diagrammes?

Still a wee bit difficult with only 5 dimensions
7. Joint Distribution

So we are going to make a MD measure. What kind shall we make?

These can be divided broadly into two types:

*Marginal Measures*

*Measures that reflect Joint Distribution*
Why do Joint Distribution methods add value?

Matrix 1

\[
g^0 = \begin{bmatrix}
0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 \\
1 & 1 & 1 & 1 & 1 \\
.25 & .25 & .25 & .25 & .25 \\
\end{bmatrix} \ldots \begin{bmatrix}
0 \\
0 \\
0 \\
4 \\
.25 & .25 & .25 & .25 & .25 \\
\end{bmatrix}
\]

Matrix 2

\[
g^0 = \begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 \\
.25 & .25 & .25 & .25 & .25 \\
\end{bmatrix} \ldots \begin{bmatrix}
1 \\
1 \\
1 \\
1 \\
1 \\
\end{bmatrix}
\]
Why do Joint Distribution methods add value?

Marginal Measures ONLY use this vector to create their measures. So according to ANY marginal measure, the poverty of Matrix 1 = the poverty of Matrix 2.
The joint distribution tells a different story

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Panel A. Marginal distribution: % children under 5 deprived in...</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health (1)</td>
<td>43.5</td>
<td>39.8</td>
<td>26.7</td>
<td>19.9</td>
</tr>
<tr>
<td>Nutrition (2)</td>
<td>74.3</td>
<td>62.2</td>
<td>61.4</td>
<td>58.3</td>
</tr>
<tr>
<td>Improved Sanitation (3)</td>
<td>72.5</td>
<td>68.4</td>
<td>79.1</td>
<td>58.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel B. Joint distribution: % children under 5...</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deprived in at least one dimension (union)</td>
<td>93.3</td>
<td>88.6</td>
<td>91</td>
<td>82.9</td>
</tr>
<tr>
<td>Deprived in all three dimensions (intersectn)</td>
<td>26.6</td>
<td>21.1</td>
<td>16.3</td>
<td>8.6</td>
</tr>
</tbody>
</table>

Source: Roche (2012) based on Bangladesh Demographic Health Survey data. The example follows a similar illustration from Atkinson and Lugo (2010) reproduced in Ferreira and Lugo (2012)

Note: (1) No immunized or did not received medical treatment when sick; (2) Either underweight, stunting, or wasting; (3) MDGs indicator standards.

The joint distribution provides an indication of the intensity of deprivations that batter the poor at the same time.
8. 2010 HDR sparked debate

- HDI: Blogs and *Lets Talk HD*
- MPI: Blogs and papers
- Governments: what data? Our voice?
9. Political space is opening; demand increases

- Sarkozy Commission: Stiglitz Sen Fitoussi
- National Demands for MD Pov
- National interest in Well-being & Progress
“those attempting to guide the economy and our societies are like pilots trying to steering a course without a reliable compass. …

“We are almost blind when the metrics on which action is based are ill-designed or when they are not well understood. For many purposes, we need better metrics.”
10. Interest in MD Poverty

**Ethical:** “Human lives are battered and diminished in all kinds of different ways.” *Amartya Sen*

**Efficiency:** “Acceleration in one goal often speeds up progress in others;” to meet MDGs strategically we need to see them together. *Roadmap towards the Implementation of the MDGs*

“Achieving the MDGs will require increased attention to those most vulnerable.” *UNDP MDG Report 2010*

National MD Poverty measures: being designed in many countries to monitor change, to target, and to supplement income data.
Methodology: $g_0(k)$ matrix

Adjusted Poverty Headcount = $M_0 = H \times A = .442$

$k=3$ (you could calculate for each value of $k$)

Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>$c(k)$</th>
<th>$c(k)/d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H$</td>
<td>0.75</td>
<td>75%</td>
</tr>
<tr>
<td>$A$</td>
<td>0.59</td>
<td>59%</td>
</tr>
<tr>
<td>$M_0$</td>
<td>0.442</td>
<td></td>
</tr>
</tbody>
</table>

\[
g^0(k) = \begin{bmatrix}
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1.67 & 1.67 & 1.67 & 1.67 & .55 & 0 & 0 & 0 & 0 & .55 \\
0 & 1.67 & 0 & 1.67 & .55 & 0 & .55 & .55 & .55 & 0 \\
0 & 0 & 0 & 1.67 & .55 & .55 & .55 & 0 & .55 & .55 \\
\end{bmatrix}
\]

$H = \text{Headcount} = \frac{3}{4} = 75\%$

$A = \text{Average deprivations among the poor} = \frac{(0.776+0.553+0.442)/3}{0.59} = 59\%$

$M_0 = HA = .442$
10. Interest in AF Poverty measure

1. **Birds-eye view** - can be unpacked
   a. by region, ethnicity, rural/urban, etc
   b. by indicator, to show composition
   c. by ‘intensity’ to show inequality among poor

2. **Adds Value:**
   a. focuses on the multiply deprived
   b. shows joint distribution of deprivation.

3. **Incentives** to reach the poorest of the poor

4. **Flexible:** you choose indicators/cutoffs/values

5. **Robust** to wide range of weights and cutoffs
Motivations for new Multidimensional Measures

• Provide an **overview** of multiple indicators at-a-glance
• Show **progress** quickly and directly *(Monitoring/Evaluation)*
• Inform **planning** and **policy** design
• **Target** poor people and communities
• Reflect people’s **own understandings** *(Flexible)*
• **High Resolution** – zoom in for indicator details
Applications
## Different types of applications

<table>
<thead>
<tr>
<th></th>
<th>International Comparisons</th>
<th>National realities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multidimensional Poverty</strong></td>
<td>MPI (UNDP’s HDR)</td>
<td>Colombian MPI, Mexico national poverty measure, Philippines multidimensional poverty index.</td>
</tr>
<tr>
<td><strong>Income Poverty</strong></td>
<td>US$ 1.25 a day</td>
<td>Colombian income poverty measure</td>
</tr>
<tr>
<td><strong>Other applications</strong></td>
<td>Bhutan’s Gross Happiness Index, Women in Agriculture Empowerment Index (USAID)</td>
<td></td>
</tr>
</tbody>
</table>
The Global MPI

• The global Multidimensional Poverty Index (MPI) is an international measure of acute poverty covering over 100 developing countries. It complements traditional income-based poverty measures by capturing the severe deprivations that each person faces at the same time with respect to education, health and living standards.

• The global MPI has been reported and updated in UNDP’s Human Development Report since 2010.
1. Data: Surveys

Demographic & Health Surveys (*DHS* - 51)
Multiple Indicator Cluster Surveys (*MICS* - 30)
World Health Survey (*WHS* – 17)

Additionally we used 6 special surveys covering urban Argentina (ENNyS), Brazil (PNDS), Mexico (ENSANUT), Morocco (ENNVM), Occupied Palestinian Territory (PAPFAM), and South Africa (NIDS)

Constraints: Data are 2002-2011. Not all have precisely the same indicators.
2. MPI Dimensions, Weights & Indicators

Three Dimensions of Poverty

- Health
  - Nutrition
  - Child Mortality
- Education
  - Years of Schooling
  - School Attendance
- Living Standard
  - Cooking Fuel
  - Improved Sanitation
  - Safe Drinking Water
  - Electricity
  - Flooring
  - Assets
3. Identification: Who is poor?

People are multidimensionally poor if they are deprived in 33% of the dimensions.

Endah’s deprivations: 73%
3. What is the MPI?

- The MPI is one implementation of the first measure of the Alkire & Foster family.
- The MPI is the product of two components:

\[
M_0 = H \times A
\]

1) **Incidence** ~ the percentage of people who are disadvantaged, or the headcount ratio \( H \).

2) **Intensity** of people’s deprivation ~ the average share of dimensions in which disadvantaged people are deprived \( A \).
WHERE THE POOR LIVE
104 Developing Countries:

~ 29 Low Income Countries, (681M), 86%
~ 67 Middle Income Countries, (4634), 93%:
  ~ 42 Lower Middle Income (2433M) 98%
  ~ 28 Upper Middle Income (2201M) 89%
~ 8 High Income Countries (43M), of which:
  ~ 5 OECD (29M)
  ~ 3 non-OECD (13M)

**Total Population:  5.4 Billion people**

Which is 78% of the world’s population
(population figures from 2010; data from 2002-2011).
Half of the world’s MPI poor people live in South Asia, and 29% in Sub-Saharan Africa.
Most poor people live in middle-income countries. 72% of MPI poor people live in Middle Income Countries.
Comparing the Headcount Ratios of MPI Poor and $1.25/day Poor

Intensity 69.4% & More
Intensity 50-69.4%
Intensity 44.4-50%
Intensity 33.3-44.4%
$1.25 a day
The composition of the MPI

% Contributions:
Show which indicators contribute most to poverty by group. Reflects weights.

Available for every subgroup data allow.
The composition of the MPI (India – State level)
Censored Headcounts: Show % of people who are poor AND deprived in each indicator.
DISPARITIES
MPI varies greatly within income categories
India: 
Incidence: 12.4% to 79.3%
Intensity: 40.2% to 60.3%
CHANGES OVER TIME
Analysis over time in 22 countries

Poorest Countries, Highest MPI

The size of the bubbles is a proportional representation of the total number of MPI poor in each country.
Changes over time in MPI

Multidimensional Poverty Index (MPI) over Time

18 countries have statistically significant MPI reduction at \( \alpha=0.05 \)

Note: *** statistically significant at \( \alpha=0.01 \)
      ** statistically significant at \( \alpha=0.05 \),
      * statistically significant at \( \alpha=0.10 \)
Changes over time in MPI

- Annualized Absolute Variation

- Largest Absolute poverty reduction

- in top 7

- in top 3

- Madagascar 2004-2008/9
- Armenia 2005-2010
- Jordan 2007-2009
- Guyana 2005-2009
- Senegal 2005-2010/11
- Colombia 2005-2010
- Peru 2005-2008
- India 1999-2005/6
- Zimbabwe 2006-2010/11
- Malawi 2004-2010
- Kenya 2003-2008/9
- Nigeria 2003-2008
- Lesotho 2004-2009
- Ethiopia 2005-2011
- Ethiopia 2000-2005
- Uganda 2006-2011
- Bolivia 2003-2008
- Cambodia 2005-2010
- Tanzania 2008-2010
- Ghana 2003-2008
- Bangladesh 2004-2007
- Rwanda 2005-2010
- Nepal 2006-2011
How the star performers reduced MPI

Nepal (.350)  Bangladesh (.365)  Rwanda (.460)

Annualized Absolute Change in proportion who is poor and deprived in...

- Nutrition
- Child
- Mortality
- Years of Schooling
- Attendance
- Cooking
- Fuel
- Sanitation
- Water
- Electricity
- Floor
- Assets
Performance of Sub-national Regions
Looking Inside the Regions of Bolivia…

Nutrition

Child Mortality

Years of Schooling

Attendance

Cooking Fuel

Sanitation

Water

Electricity

Floor

Assets
LEAVING NO ONE BEHIND:

Destitution
Destitution: A subset of the poor

- This year we release a study of destitutes – people who are MPI poor but are extremely deprived – experiencing severe malnutrition, losing 2 children, open defecation, no one has more than 1 year of school, kids out of primary school.

- We analyse over 91 countries with this measure with 3.6 billion people. We find that a sad and high percentage of MPI poor are also destitute – yet that countries vary a lot in eliminating destitution.
<table>
<thead>
<tr>
<th><strong>Indicator</strong></th>
<th><strong>Deprivation Cutoff</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling</td>
<td>No one completed at least one year of schooling ((\geq 1))</td>
</tr>
<tr>
<td>Attendance</td>
<td>At least one child not attending school up to the age at which they should finish class 6</td>
</tr>
<tr>
<td>Nutrition</td>
<td><strong>Severe Undernourishment</strong> of any adult ((\text{BMI}&lt;17\text{kg/m}^2)) or any child (-3 standard deviations from median)</td>
</tr>
<tr>
<td>Mortality</td>
<td>2 or more children died in the household</td>
</tr>
<tr>
<td>Electricity</td>
<td>The household has no electricity (No change)</td>
</tr>
<tr>
<td>Sanitation</td>
<td>There is no facility/bush, or other (open defecation)</td>
</tr>
<tr>
<td>Water</td>
<td>The household does not have access to safe drinking water, or safe water is more than a 45-minute walk (round trip)</td>
</tr>
<tr>
<td>Floor</td>
<td>The household has a dirt, sand, or dung floor (No change)</td>
</tr>
<tr>
<td>Cooking fuel</td>
<td>The household cooks with dung or wood (coal/lignite/charcoal are now non-deprived)</td>
</tr>
<tr>
<td>Assets</td>
<td>The household has no assets (radio, mobile phone, etc) and no car</td>
</tr>
</tbody>
</table>
What % of MPI poor are destitute?

Where MPI is high, a higher share of poor are destitute. Countries with similar MPI have different % of destitutes.

Upper and Lower circles have similar MPI values, but a larger share of MPI poor are destitute in Upper. Can we learn from Lower?
Some considerations

• The MPI is a measure of *acute* poverty. Thus, results are not relevant for some regions (e.g. LAC).
  – Need for regional indices

• Problems with data or agreement on indicators
  – Need for better data
  – Work with statistical offices
National Adaptations
The MPI-Colombia:

• Proposed by the National Planning Department based on the Alkire & Foster methodology

• Instrument for design and monitoring public policy and for targeting

• Complements Colombia’s income poverty measure

• Discussed with the Colombian academy and policy makers
Dimensions, Variables and Weights

MPI-Colombia

Educational Conditions
- Schooling
  - School Attendance
  - At the right level
  - Access to infant services
  - Illiteracy
    - No Child Labour

Childhood & Youth
- Work
  - Absence of long-term unemployment
  - Formal work

Health
- Coverage
  - Access to health care given a necessity

Housing & Public Services
- Improved Water
  - Sanitation
  - Flooring
  - Exterior Walls
  - Overcrowding

Weights:
- 0.2
- 0.2
- 0.2
- 0.2

Weights:
- Schooling: 0.1
- School Attendance: 0.2
- Illiteracy: 0.05
- No Child Labour: 0.04
Multidimensional Poverty in Mexico
Methodology & results

First released December, 2009
What are the main features of the new methodology?

Current income per capita

- Education
- Health
- Social Security
- Housing
- Basic Services
- Food
Total Population 2008

**Vulnerable by social deprivations**
- 33.7%
- 35.2 millions
- 2.0 Deprivation average

**Moderate Poverty**
- 10.5%
- 11.2 millions
- 3.9 Deprivation average

**Extreme Poverty**
- 4.5%
- 4.8 millions

**Vulnerable by income**
- 18.3%
- 19.5 millions

**Total Population 2008**
- 33.0%
- 35.2 millions
- 2.0 Deprivation average
- 18.3%
- 19.5 millions
Other experiences

- **Official measures:** The Philippines, Bhutan, South Africa, Minas Gerais (Brazil).
- **In process:** Chile, El Salvador, China, Iraq, Morocco, Nigeria, Vietnam.
- **Regional initiatives:** UNDP LAC, ECLAC, Himalayas, MENA.

www.ophi.org.uk
Some considerations:

• Policy-oriented vs. ‘aspirational’
• Include income or not?
• Which dimensions, cut-offs and weights?
Other AF Applications

• Bhutan: Gross National Happiness Index
• Women’s Empowerment in Agriculture Index
www.ophi.org.uk