Working Paper Number 10

Gender Sensitivity of Well-being Indicators

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In this paper, we assess the gender sensitivity of some conventional indicators of well-being in developing countries as also the relationship between poverty and the gender differential. The assessment is restricted to the indicators of the basic 'functionings' of 'being healthy', 'being educated', 'being nourished' and some composite indices which combine the indicators of individual functionings. Of the 'being healthy' indicators assessed, a disaggregated under-10 sex ratio (0-4 years and 5-9 years) appears to be sensitive to gender differentials. We believe that it could be a more reliable indicator than the overall female male ratio, life expectancy at birth, maternal mortality rates and morbidity assessment. Of the 'being educated' indicators, flow variables (especially gender differentials in enrolment rates), which assess education in younger age groups appear to be more useful and sensitive to gender differentials in developing countries than stock variables (like adult literacy and mean years of schooling). In countries with universal primary, secondary and tertiary education, an index of segregation in fields of study could provide interesting information. Indicators of 'being nourished' suffer from drawbacks related to data collection and interpretation which reduce their value as reliable indicators of gender differential. Of the composite indicators assessed, we identify certain alterations to each component of the Gender-related Development Index, which are worthy of further investigation. It is possible that these modifications could make the Index more relevant for use in developing countries. The evidence reviewed in this paper also suggests that except for the gender gap in education, it is not evident that gender inequality is universally higher amongst low income groups. Implications for policy and research relate to the proposal for collecting data related to gender-sensitive indicators in national censuses, the need to gender disaggregate data for differing levels of income and the need to feed research about social processes of gender differentials into policy in order to raise awareness and increase the effective use of indicators by policy makers.

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Paper to be presented at the UNRISD/UNDP/CDS workshop

Gender, Poverty and Well-being: Indicators and Strategies

24-27 November 1997 Trivandrum, Kerala, India

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1. Introduction

The Fourth World Conference on Women built upon the anti-poverty momentum of the World Summit for Social Development. High on the agenda is a fight against poverty based not only on economic growth but also the achievement of social goals - including gender equity. If such commitments are to be translated into effective and enabling policies for women however, a number of analytical and research gaps need to be addressed. In this paper we attempt to make a contribution in this direction by examining the sensitivity of some indicators of gender inequality in well-being.

The paper is organised as follows. First the remit is clarified (Section 2). Next, we describe the 'functionings' framework within which well-being will be assessed (Section 3). Indicators which relate to the basic 'functionings' of being healthy, being nourished, being educated and some composite indicators which assess a combination of functionings will be critically analysed with respect to their sensitivity to gender inequality (Section 4 – Section 7). The paper concludes with implications for policy and suggestions for future work (Section 8).

2. Remit

The UNRISD remit for this paper is as follows:

> "*...critically assess the usefulness and relevance of a selected number of quality of life indicators - mortality, morbidity and nutritional status - in capturing gender discrimination...*[with emphasis on] *...those indicators that are being widely used by policy making institutions to monitor female poverty and /or gender differences in well-being*".
> (Gender, Poverty and Well-Being Project Proposal)

In addressing this, it is important to distinguish two issues. The first is the identification of gender inequality in well-being and the second the causes underlying the inequality. This paper is only concerned with the first. Further, it will only consider differentials in well-being as assessed by conventional quality of life indicators. The relationship between poverty and gender differentials in these conventional indicators will also be explored. The less familiar territory of indicators of autonomy and power will be covered by a complementary paper.

3. **Assessment of well-being**

Male and female well-being could be assessed on the basis of commodities they possess, of what they succeed in doing with the commodities (functionings) or of the utility (happiness or desire fulfilment) that these give the person. The first part of this section describes briefly the different approaches to well-being assessment. The advantages of the functionings-based approach used in this paper, over others, particularly with reference to assessing gender differentials are discussed (Section 3.1). Some properties of 'good' indicators used to assess functionings are outlined in Section 3.2. This is followed by a clarification of the geographical regions for which such indicators will be analysed in this paper (Section 3.3).

3.1 **Approaches to well-being assessment**

Two main approaches to assessing well-being have either been *utility-based* (assessing happiness or desire fulfilment) or *commodities-based* (assessing opulence criteria like income, assets, and wages)[1]. The limitations of both these in assessing well-being have been described extensively in the literature (for example, in Sen 1985), and are only illustrated here. A utility-based approach which assesses well-being on the basis of happiness achieved or desire fulfilment suffers from the drawbacks of 'physical condition neglect' and 'valuation neglect'. 'Physical condition neglect' is particularly important in the context of assessing class, caste and gender differentials. For example, a woman who is suppressed or poor and undernourished with no hope of getting a better deal may just resign herself to this state, be happy with small comforts and desire only what seems 'realistic'. Judged by the metric of happiness or desire fulfilment therefore, she may appear to be doing well although physically quite deprived. This neglect of the physical condition is reinforced by 'valuation neglect'. The reflective activity of valuation, for example whether the woman would value the removal of the deprivation, is neglected (Sen, 1985).

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[1]Traditionally, the analysis of well-being has used market purchase data to reflect happiness/desire fulfilment. This confuses the state of a person with the extent of his/her possessions (Sen, 1985).

Similarly in the case of the commodities approach, which commonly assesses well-being on the basis of possession of the commodities, possession may not necessarily translate into well-being. Besides, most commodity measurements (income, consumption data, etc.) are made on the household rather than on the individual. Assumptions are made about the patterns of intra-household distribution. In the context of gender differentials however, gender relations in the household may affect the intra-household distribution such that the assumption of equal distribution does not hold.

Given the inadequacy of the above approaches, especially in the context of the assessment of gender differential, we use the *functionings* approach pioneered by Sen. This is based on an alternative notion of well-being directly concerned with a person's quality of life and measured on the individual through a range of social indicators (Sen 1985). The central focus of this approach is not the possession of the commodity but what the person succeeds in doing with the commodity and its characteristics. For example the possession of food is not as important as the outcome, or *functioning,* of `being nourished'. It is beyond the scope of this paper to give the details of this approach — the reader is directed to Sen (1985) for the details and mathematical framework and directed for critical appraisals to Dasgupta (1993) and Granaglia (1996) amongst others. Here we simply present a list of the relevant terms along with their non-technical meanings:

1. **Commodity vector.** This is the list of commodities possessed by a person. For example, a person may have the commodity vector: *[sack of rice, bicycle].*
2. **Commodity characteristic vector**. This is the list of 'characteristics' of the commodities possessed by the person. Thus, for the commodity vector above*: [nutrition, transport].*
3. **Functioning.** A functioning is what a person succeeds in doing with a single commodity and its characteristics, in his possession. It is an achievement of the person. Thus for the commodity *(sack of rice)* with its characteristic *(nutrition),* the person could achieve the functioning: *(moderately nourished).*
4. **Functioning vector.** This is a list of functionings. It gives a snapshot of a person's 'state of being', given their utilisation of their commodity characteristic vector. For example, a utilisation of the vector in 2 above, could result in: *[moderately-nourished, mobile].* Note that a functioning as in 3 above results from the use of a single

commodity and its characteristics. Other utilisations (for example, choosing not to use the bicycle) could result in different functioning vectors like*: [well-nourished, non-mobile]*. Each functioning vector gives the 'state of being'.

5. **Capability set.** This is the set of all possible functioning vectors that a person can achieve. This is governed by the person's access to commodity vectors and utilisations feasible. For example, if the person in our running example only had access to the commodity vector shown, and was only able to choose between the utilisations mentioned earlier, the capability set is[2]:

   {*[moderately-nourished, mobile*], *[well-nourished, non-mobile]}.*

   The capability set is thus obtained from applying all feasible utilisations to all possible choices of commodity characteristic vectors. The person can then select a preferred functioning vector from this set to lead his/her life. This is thus the person's 'chosen state of being'. Thus, "just as the so-called 'budget set' in the commodity space represents a person's freedom to buy commodity bundles, the 'capability set' in the functioning space reflects the person's freedom to choose from possible livings" (Sen 1992, p 40).

6. **Well-being.** This is a person's evaluation of a functioning vector, reflecting the value placed on that 'state of being'. Depending on the evaluation of well-being for each functioning vector, the person will choose one of the vectors. He or she thus has a particular level of well-being in this 'chosen state of being'. Since the process of evaluation varies from person to person, it would appear to confound any straightforward comparisons of well-being. Nevertheless, as pointed out by Sen (1985), it may be possible to agree on some minimal constraints on the different states of well-being. This is particularly the case when dealing with basic functionings. For example, all personal evaluations might agree that the well-being of a person with a functioning vector *[ill-nourished, mobile]* will be less than one with the vector *[well-nourished, non-mobile]*. A personal evaluation may be 'partial' in the sense that it cannot distinguish the ordering between some vectors, for example *[well-nourished,*

[2] The person may have access to several alternate commodity vectors from which one will have to be chosen and may also be able to choose between a number of different utilisations. For simplicity, we are restricting access to just one commodity vector and two possible utilisations.

non-mobile] and *[moderately-nourished, mobile]*. This 'partial' nature also extends to the minimal constraints that are agreed upon by a group.

Sen (1985) gives examples of functionings ranging from 'elementary' ones like being adequately nourished, being healthy, avoiding escapable morbidity etc. to 'more complex' ones like having self-respect, taking part in the life of the community etc. In this paper, we examine three subjectively identified functionings, namely: being healthy, being nourished and being educated. We adopt the position that in developing countries, gender-differentials may persist even at the level of such 'basic' functionings[3], and proceed to analyse indicators that can reliably capture gender-differentials in these functionings.

The translation of gender differences in the basic functionings, to corresponding differences in well-being makes certain assumptions. First, that the functionings considered are so elementary as to be necessary for well-being. That is, they will appear in the functioning vectors of all people. Second, that all personal evaluations will agree that a differential in any one of the functionings will result in a differential in well-being. Table 1 shows the consequences of this second assumption.

Table 1 Gender differentials in well-being

Situation	**'Being healthy'**	**'Being educated'**	**`Being nourished'**	**'Well-being'**
	Female < Male	Female < Male	Female < Male	Female < Male
(1)	(2)	(3)	(4)	(5)
1	No	No	No	No
2	No	No	Yes	Yes
3	No	Yes	No	Yes
4	No	Yes	Yes	Yes
5	Yes	No	No	Yes
6	Yes	No	Yes	Yes
7	Yes	Yes	No	Yes
8	Yes	Yes	Yes	Yes

At this point, it would appear that more could be said than just a "Yes" or "No" in Column 5. For example, a simple counting of the functionings showing a differential,

[3] Theoretically, the functionings approach allows well-being to be assessed by examining the complete capability set. This is because the extent of the freedom to choose determined by the capability set may itself contribute to some extent to well-being. In practice, we are restricted by the fact that data is only available for the functionings actually achieved. By further restricting our study to the basic functionings listed, the space of functionings resembles the space of basic needs used by Streeten *et al* (1981).

appears to suggest that female well-being is worse in Situation 8 than in Situations 4, 6, and 7. These in turn are worse than Situations 2, 3, and 5, with Situation 1 being ideal. Note this elaboration makes the assumption that all evaluations will agree on this ordering as well. Even finer-grained distinctions may be possible by accounting for the extent of differentials in functioning (and not just the existence of a differential), as captured by the values of the indicators involved. This is done by the composite assessment indices discussed in Section 7.

We note in passing that it has not escaped our attention that a complete assessment of well-being would account for other functionings like human agency, power, autonomy etc. (this point is cogently argued by Razavi, 1996). By including `being educated', we have moved one step beyond the conventional physiology-based functionings. The evaluation is however still restricted here to basic functionings and is in no way complete.

0.1 **Properties of good indicators**

We consider a good indicator to have the following properties. It should be easily measurable, affordable and reliable in identifying gender differentials. The reliability of an indicator can be judged by examining the types of errors it commits. An indicator which performs errors of commission, (i.e. identifying a differential when it does not exist) is preferred to one that performs errors of omission (i.e. failing to capture differential when it does exist).

0.2 **Geographical regions covered**

The discussion does not concentrate on any particular region in the developing world. Studies from different parts as well as different levels of aggregation (micro-level studies as well as international country comparisons) are drawn upon where needed to illustrate or clarify a point. Driven by data-availability, most research on health and nutrition concentrates on South Asia. Some studies in sub-Saharan Africa are referred to in relation to nutrition. The discussion on education is largely confined to the global level. Since gender gaps in education are greatest in sub-Saharan Africa and South Asia however, some micro-level studies in these regions are drawn upon. The composite indicators recently proposed in the Human Development Reports have not been used at the micro -level extensively and their discussion is restricted to the global level.

A shortcoming in all sections is that the Latin American region has not been covered in any detail. A further drawback is the exclusion of studies covering indicators which are highly specific to particular situations. Rather we concentrate on internationally comparable indicators[4].

1. **Being healthy**

The spectrum of health ranges from good health at one extreme to morbidity somewhere in between to the state of fatal ill-health i.e. mortality. Gender differentials in health (as assessed by indicators of mortality and morbidity) are taken to reflect underlying differences in care, treatment and nutrition[5]. Indicators of mortality are considered first in Section 4.1 followed by a discussion of indicators of morbidity in Section 4.2. An outline of the indicators to be discussed in the two groups is given in Figure 1. Section 4.3 looks at the relationship between poverty and gender differentials in mortality as well as morbidity. Section 4.4 summarises the discussion on the functioning ‘being healthy’.

Figure 1 Indicators of 'being healthy'

1.1 **Differential mortality indicators**

Biological factors seem to ensure higher female survival than male, right from the foetal stage and infancy onwards. During infancy females have a higher resistance to infectious disease. Later in life, differences in sex hormones causing increased death rates in men by accidents and other violent causes and protection in women to ischaemic heart diseases, combine to ensure that female survival is higher than male given similar care

[4] Internationally comparable indicators of well-being are quite slow to be created. Meantime, rapid economic and social change may be accompanied by swift alterations in the relative status of the genders. Such alterations may be highly specific (exemplified by the rising incidence of both female infanticide and excess female child mortality in South India where the status of women was formerly relatively high). In such cases the indicators and evidence are likely to be highly specific and idiosyncratic and the research participatory and activist. The United Nations, while unable to do more than act as an observer in such an arena, can at the least be seen to give legitimacy to such actions.

[5] Gender gaps in the physiology based functionings assessed by indicators of mortality and nutritional status are taken to reflect discrimination in underlying health care, treatment and nutrition. This discrimination may find explanation in the perceived worth of women theorised for India in economic forms by Bardhan (1974); Miller (1981); amongst others and /or in kinship systems theorised in cultural forms by Dyson and Moore (1983) and Dasgupta (1987a).

Razavi (1996) has argued that high differentials in mortality could co-exist without any gender differentials in food intake and could be largely due to differentials in the disease context and parental health behaviour.

(Waldron, 1983)[6]. These differences in mortality are reflected in the female male ratio (FMR). The ratio is low at birth with an average of 5% more males born than females (probably to compensate for subsequent higher male mortality). Due to higher male than female mortality in infancy and adolescence, the FMR becomes equal by the age of 30 (Holden, 1987). Female survival continues to be higher than male in later years causing the FMR to tip towards females. Countries in Europe and North America have on an average 105 and sub-Saharan Africa has 102 females for every 100 males. There are however fewer females than males in a number of Asian, Middle Eastern and North African countries like Egypt and Iran with 97, Turkey with 95, China with 94, India with 93, Pakistan with 92 and Saudi Arabia with 84 females per 100 men (Sen, 1995). Errors of enumeration, migration and the sex ratio at birth fail to explain these FMRs[7]. Increased female mortality (over that of males) seems to be the only reasonable explanation. Since women are hardier than men and given similar care survive better at all ages right from the intra-uterine period, an explanation for the increased mortality is sought in social factors. The FMR can thus be seen as an indicator which gives a summary of gender inequality as it operates over a long time (Sen, 1995). From the view of policy formulation and identification of points of intervention however it may be more useful to identify the age groups responsible for the masculinisation of the FMR. Such information is best obtained by looking at indicators of age-specific death rates which are discussed in Section 4.1.1. A high maternal mortality rate which also contributes to masculinisation of FMR is discussed separately in a note in Section 4.1.2. Life expectancy which is often used as an indicator of differential mortality is discussed in a note in Section 4.1.3.

1.1.1 *Age specific death rates*

Age-specific death rates are normally calculated for groups of 5 years. The age groups which have a high impact on sex ratios are 0-4 and 5-9 and 15-34 (largely the impact of maternal deaths). Maternal mortality rates are discussed separately in Section 4.1.2. The under 10 mortality rates are discussed here.

[6] There is some debate on the extent to which the female advantage in survival is culturally linked. Biological differences could be reinforced by social influences fostering risky behaviour in males, and until recently higher tendency of men to smoke than women (Sen, 1995).

[7] There is some impact of male migrant workers in the case of Saudi Arabia (Sen, 1995).

The under-10 age group is singled out for attention for two reasons. First, in developing countries like India, the age group with the most pronounced female disadvantage and therefore highest mortality differentials is the juvenile i.e. under 10 years group (Chatterjee, 1990; Bennet 1991 cited in Agnihotri, 1997). Second, under 10's constitute a large proportion of the total population under high mortality conditions. Differentials in mortality in these ages therefore have a greater impact in influencing the sex ratio than those in older age groups.

In the under 10 age group, the largest proportion of deaths occur in developing countries in the first year of life. The infant mortality rate (IMR) is therefore distinguished from overall juvenile mortality rates and each is discussed below in turn.

Infant mortality rate. Biologically, female infants are more robust with a higher resistance to infections and would therefore be expected to show an infant mortality rate lower than that of males- the average ratio of female to male infant mortality in developed countries is 0.8 (United Nations, 1995). If females show infant mortality higher than that of male infants, it can be inferred to be due to environmental disadvantages related to diet and health care (Waldron, 1983).

The IMR could however give a misleading picture because the factors affecting mortality differ between the neo-natal and post-neonatal period[8]. Two divergent demographic trends could be concealed in the period labelled "infancy". For example, a study by Padmanabha (1982) showed a higher male mortality (19.5 per 1000 compared to 16.8 per 1000 for girls) among new-born infants (0-24 days). Post-neonatal mortality rates were higher for females (11.9 per 1000 compared to 9.9 per 1000 for boys). The overall infant mortality rates (29.4 per 1000 for boys and 28.7 per 1000 for girls) however obscured these differences (Padmanabha, 1982 cited in Seddon, 1997). In such situations juvenile (under 10) mortality rates are more transparent and sensitive to gender inequality.

Juvenile mortality rates. Disaggregated data on juvenile mortality may not be easily available. Enumerations of male and female populations from which the female male

[8] The general consensus in literature appears to be that the neonatal mortality is primarily affected by endogenous factors which affect the foetus intra-uterine and continue to influence its survival for the first 4 weeks of life. Post-neonatal however is mainly determined by exogenous factors relating to the physical environment for example, infections, respiratory or parasitic diseases (Visaria, 1988; Waldron 1983; Caldwell and Caldwell, 1990 cited in Agnihotri, 1997). Since females have higher immunity to infections during infancy, a female post-neonatal mortality which is higher than that of males could be due to behavioural discrimination.

ratio (FMR) can easily be obtained are however readily obtained. In place of juvenile mortality rates therefore, Agnihotri (1997) proposes an alternative measure which would largely capture similar information - i.e. the under 10 FMR, also called the juvenile sex ratio[9].

Harriss, (1993) supports a further disaggregation of the juvenile sex ratio and the use of the 1-4 ratio (i.e. FMR14) because it summarises the experience of neonatal, infant and early childhood mortality[10]. Chen's (1982) research in Matlab Thana in Bangladesh, in the 70's shows that by the 4th year female deaths exceeded male by 53% then fell, but were always higher than male, peaking again during reproductive years. FMR up to age 4 therefore captures the high differentials. Agnihotri (1997) however argues that the under 4FMR (FMR04) is not as powerful and sensitive an indicator of gender inequality as is the FMR59. For a start FMR04 captures the excess male infant mortality, which is essentially a biological phenomenon (Waldron,1983; and Klasen 1994 cited in Agnihotri, 1997). FMR59 on the other hand reflects the deaths occurring in the 1-4 age group in which more females die invariably due to behavioural factors (Waldron, 1983; Miller 1981; Johansson, 1991; Kishor 1993; cited in Agnihotri, 1997). Further, since 90% of juvenile deaths occur in the under 5 group, Agnihotri contends that FMR59 is virtually unaffected by deaths in 5-9 age group. A combination of FMR04 and FMR59 is therefore proposed for identifying mortality differentials in childhood as well as identifying the age group at which differentials set in (Agnihotri, 1997)[11]. Such disaggregation of the juvenile group is important because differing combinations of FMR04 and FMR59 can give rise to apparently similar juvenile sex ratio's thus masking differentials in particular age groups. For example, consider groups or regions that show a moderate to high FMR04 and a subsequent sharp drop to low FMR59 (indicative of a female child mortality that is higher than the male - confirmed by examining mortality data). The overall juvenile sex ratio in this case could appear balanced hiding the adverse survival conditions for the girl child.

In the absence of discrimination, the FMR04 would be expected to be above that at birth (i.e. above 960 for India according to the 1981 census figures) due to higher male infant

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[9] The juvenile sex ratio has the added benefit of eliminating the effects of sex-selective migration.

[10] Juvenile refers to under 10 and child refers to under 5 years of age.

[11] Strictly, a 0-2 and 3-9 Juvenile sex ratio would actually give sharper difference, but since the 1981 census data available to Agnihotri only gave 5 year age group data at the district level, these 0-4 and 5-9 groupings were used.

mortality[12]. Assuming that the care of the child was not gendered and since males do not suffer any additional biological disadvantage in childhood, FMR59 would be expected to continue to remain the same as the FMR04. Contradictions to such expected FMR04 and FMR59 values however, can shed light on the issue of gender differential mortality. Agnihotri's analysis of FMR04 and FMR59 of district level data[13] from the 1981 Indian Census gave the following important results:

- Some regions showed an unusually low FMR04 (below 950) suggesting very strong gender bias with high female mortality even in infancy. Some showed an alarmingly low ratio (below 900). For example, the Salem district, the only district in South India to show the low FMR04 value below 900 has been in the news for the practice of sex selective infanticide (George *et al*, 1992 cited in Agnihotri, 1997 and Chunkath and Athreya, 1997).
- Some regions showed a drop between FMR04 and FMR59[14]. These as well as regions with very low FMR59 (below 850) were shown to have high girl child mortality above that of male mortality and needed to be viewed with alarm.
- Some groups despite showing a high IMR (and therefore high male infant mortality) were found to have low FMR04 and FMR59[15]. This therefore was taken to be an indication of very strong discrimination against the female.
- Some regions showed unusually high FMR04 and FMR59 values (typically over 1000). Rather than accepting this as an absence of female discrimination a pursuit of this finding for the tribal population of 36 districts revealed poorer antenatal care and immunisation coverage of tribal children, possibly translating into excess foetal wastage and infant mortality due to poverty and an underdeveloped health structure.

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[12] Agnihotri (1997) assigns 4 different levels to the FMRs: low (below 910), moderate (910 to 960), high (960 to 1000) and very high (above 1000). The cut-off value of 960 was chosen as it was close to the FMR at birth. Other values were chosen by examining the spatial distribution of FMRs which revealed contiguous district clusters with these FMRs as cut-off points.

[13] In state level averages, districts within the state, which have a high FMR are able to compensate for 'rogue' districts with low FMR's (Agnihotri, 1997). Using districts as the unit of analysis prevents such 'masking'.

[14] Normally the FMR59 would not be expected to be higher than the FMR04 as a pattern of excess female mortality that sets in early is unlikely to be reversed in later years. Agnihotri (1997) suggests that such cases, if stray, could be indicative of data errors. If persistent, he suggests that detailed micro-level study is advisable. Some however (for example Pisani and Zaba, 1997 cited in Agnihotri, 1997) argue that mortality rates for female children come down in the wake of pre-natal sex selection.

[15] With an increase in infant mortality, male infant mortality would be expected to increase more compared to that of females since males are more vulnerable.

The high IMR with the accompanying high male IMR could result in unusually high FMR04 and FMR59 values. Such values should therefore be investigated for excess male mortality during infancy and under 5.

These findings led Agnihiotri to emphasise the distinction between high FMRs and balanced FMRs. This is particularly important since, "...currently both the academic and the policy mind set treats higher FMRs as necessarily better and reduction in FMRs as necessarily undesirable. It is time that a distinction is made between high FMRs and balanced FMRs. This analysis suggests a range of 960 to 980 (*for India*) as a balanced figure or 'norm'. Districts with FMRs below this level have to catch up with the 'norm', districts with FMRs above this need closer scrutiny" (Agnihotri 1997, pp140-141) [16]. Similarly, a very high FMR at birth needs to be investigated for an unsatisfactory health delivery system - as it indicates high male mortality *in utero* due to poor maternal health and care.

The above results suggest that FMR04 and FMR59 are reliable indicators of a gender differential in the functioning 'being healthy'. Data are available from certain censuses (such as the Indian ones) and are economically affordable and relatively easily measurable, compared for example, to indicators of 'being nourished'. Agnihotri's analysis was carried out using data which were available for the FMR04 and FMR59 groups It is possible however that FMR02 and FMR39 would reveal larger differentials as they would capture more precisely the different mortality patterns in infancy and after. It would therefore be desirable to repeat the analysis on these age groups. It is also worth noting at this point that the objectivity of data can be eroded due to under-reporting, age-heaping and other kinds of age distortions which may be gendered (for example the underreporting of female deaths due to shame at the cause of death). Thus, however robust these findings are for India it would be worthwhile to obtain a similar confirmation from other countries.

1.1.2 *A note on maternal mortality rate*

[16] Agnihotri draws attention to another important distinction i.e. the decline in FMR through the reduction in IMR and the decline in FMR through the increase in female mortality rates in excess of male rates. The former being desirable, unlike the latter.

The differential death rate is high between the ages of 15-34 in developing countries, largely due to maternal mortality (Chatterjee, 1990). Maternal mortality refers to deaths that occur during pregnancy or within 42 days of delivery (or termination), per 100,000 live births. The maternal mortality rate (MMR) constitutes one of the biggest North-South gaps. The latest Human Development Report gives the high figure of 471 for developing countries as compared to 31 for industrial countries (HDR, 1997). Lack of care during pregnancy and delivery as well as a long history of neglect with undernourishment leading to stunting and poor physical growth all contribute to high MMR. It cannot however be used as a sole indicator of gender inequality. The prevalence of poverty and poor health care facilities with or without gender inequality itself could be contributing factors to the high MMR[17]. Besides, MMR is not capable of assessing differentials in situations where male well-being may be lower than the female.

1.1.3 *A note on life expectancy*

Life expectancy represents the mean length of time an individual is expected to live if prevailing mortality conditions persist throughout the person's life. It can be calculated for individuals at the time of birth or in any subsequent age group. Life expectancy at birth calculated for males and females is extensively used as a measure of gender differentials in well-being by national governments as well as the World Bank and the UNDP (as part of the Gender-related Development Index). It can however be a misleading indicator. For example the higher mortality of females in India up to the age of 35 is disguised by the estimated life expectancy at birth which is longer than that of males (Chatterjee, 1990). The higher expectation in life is largely because of the greater survival among older women which "more than compensates (mathematically speaking) for the lower survival of younger females" (Chatterjee, 1990). This is well illustrated in Table 2, taken from Karkal (1987) which shows the gain in life expectancy in India between 1970-75 and 1976-80 by age for males and females. Column 3, row 1, shows the higher gain for females of 3.146 years as compared to 1.966 years for males (column 2, row 1). Columns 4 and 5 however show that the gain for males is distributed more

[17] The Capability Poverty Measure (CPM) constructed by the HDR team has 3 components One of these is the percentage of births unattended by trained health personnel. This is a reliable indicator of variables like the MMR and is considered a reflection of "access to reproductive health services and a concrete test of access to health services in general" (HDR, 1996, p110). MMR thus has a broader use as an indicator of health services in general rather than as a sole index of gender inequality in health services.

evenly compared to that for females which took place mainly in the higher age groups. The age group above 70 shows a significantly large share of 33.67 percent of the total gain in life expectancy for females (column 5, last row) as compared to 25.10 percent for males (last row, column 4). It is misleading therefore to conclude from the overall increase in female life expectancy that there has been an improvement in female health in younger ages, especially reproductive ages (Karkal, 1987). In fact Karkal showed that the high rates of peri-natal mortality, the large proportion of low birth weight babies and the poor chance of female survival for the same period, were an indication of the poor health of women.

Table 2: Gain in life expectancy in India, between 1970-75 and 1976-80

Age Group	**Absolute**		**Percentage**	
	Male	Female	Male	Female
(1)	(2)	(3)	(4)	(5)
Total	1.966	3.146	100.00	100.00
0	0.014	0.006	0.73	0.18
1-4	0.034	0.052	1.70	1.65
5-9	0.086	0.098	4.35	3.12
10-14	0.095	0.106	4.84	3.37
15-19	0.095	0.114	4.83	3.63
20-24	0.096	0.120	4.90	3.82
25-29	0.099	0.126	5.04	4.02
30-34	0.106	0.136	5.42	4.32
35-39	0.115	0.150	5.84	4.76
40-44	0.120	0.161	6.11	5.13
45-49	0.125	0.176	6.37	5.60
50-54	0.132	0.198	6.69	6.29
55-59	0.130	0.211	6.61	6.70
60-64	0.120	0.212	6.09	6.75
65-69	0.106	0.220	5.38	6.99
70+	0.493	1.059	25.10	33.67

Source: Karkal, 1987, Table 3; Computed from Sample Registration System Data

While overall life expectancy is useful as a measure of development, the use of male and female life expectancy to capture gender differentials in well-being could therefore be misleading, masking age specific differentials in mortality. This results in the undesirable property of errors of omission.

1.2 Differential morbidity indicators

Whether there are sex differences in general morbidity, if reproductive disorders are discounted is not yet clear (Chen *et al*; 1981, Koenig and D'Souza, 1986; McNeill, 1986a). Nevertheless, the prevailing working hypothesis is that social differences in morbidity will result from the different types of work undertaken by people in the household and gender division of productive and reproductive work. Such differences will affect susceptibility, exposure, duration, severity and treatment (Caldwell and Caldwell, 1987; Cohen, 1987; Pettigrew, 1987). For example, women's nursing work increases their exposure to infection contracted by other household members while material and/or cultural constraints on resting may slow women's recovery from infection as well as from childbirth (Harriss, 1993). Gender differences in sanitation and environmental hygiene have also been hypothesised as having an impact upon morbidity. In rural North India the quality, source and degree of (faecal) contamination of bathing and clothes washing water may be gender-specific, contributing to the sexual geography of village life (Pettigrew, 1987). Similarly, it has been shown in rural Karnataka that the male health environment differs from that of the female - the former is more out of doors while the latter centres around the "dark, smoke filled kitchen" - in ways which suggest that exposure to infection may be gender-specific (Caldwell and Caldwell, 1987). Regional differences in climate could be interacting with underlying biological gender differentials causing differential morbidity. For example, male infant/child mortality were found to be much higher than female (1.51) in the mountainous Bardsir region in Iran. Razavi (1996) speculates that this could be the result of the interaction between the environmental conditions (cold winters) and the greater vulnerability of male infants to respiratory disease due to the immaturity of their lungs.

Factors described above could also interact with underlying gender differentials in health, care and nutrition causing differential morbidity. For example, a higher proportion of deaths due to coughs and disorders of the respiratory system occur in the Indian states of Gujarat, Haryana, Jammu and Kashmir, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal. The proportion is lower in the Southern states of Andhra Pradesh, Karnataka, Tamil Nadu and Kerala and in Orissa in the East. Chatterjee (1990) suggests that there may be more to this regional pattern which could be dismissed as being caused by climatic differences but which also corresponds to the North-South female mortality dichotomy, than just coincidence. The susceptibility of women to cold climate could be directly increased due to inadequate clothing when performing outdoor chores like fetching water as well as due to underlying anaemia or malnutrition. Given the cold climate, women's domestic role and seclusion as a result of which women are closeted in smoky kitchens, would make them vulnerable to respiratory disorders.

Despite evidence as described above of gender differences in morbidity arising due to underlying differentials in health or nutrition, reliable indicators of morbidity have not been developed for use by international agencies or governments because of a number of problems with data. First, morbidity data - gathered through questionnaires - tend to suffer from major biases (Sen, 1995). People's perception of illness can vary greatly depending on the medical care they normally receive and their medical knowledge. Sen gives the example of Kerala, a state in India with a relatively higher level of education and health care, versus Bihar which is very backward and towards the other end of the spectrum. Despite (or because of!) the medical care and life expectancy in Kerala, the rate of morbidity is much higher than the Indian average while that in Bihar is much lower. Medical care while reducing actual morbidity at the same time sharpens understanding and perceptions of one's illness (Sen 1995). Further, such subjectivity has particular implications when used to capture gender differentials. The material buttresses of patriarchy are "translated into health beliefs and social customs" (Caldwell and Caldwell, 1987). Women in West Bengal were reported as much more unwilling to perceive or declare their ill-health than were men (Sen, 1985). Boys in Karnataka are treated more frequently because they are believed to be sick more often on account of the perceptions of their relative weakness in childhood (Caldwell and Caldwell, 1987).

Second, if the problem of subjectivity is overcome to some extent by using hospital records on the incidence of disease, the data would tend to reflect the availability of medical care. Sen gives the simple example of a village acquiring a hospital, More people would then be treated, and thus more statistics would be available, giving the impression of a rise in morbidity (Sen, 1995). The data would also reflect information only with respect to those who have been taken to the hospital for treatment rather than actual gender differences in morbidity. In cases from north India, a marked gender imbalance in health expenditure and treatment has been recorded (Dasgupta, 1987b; Pettigrew, 1987). Females also appear to be less often referred for allopathic treatment than are males and are often treated using the other three indigenous health systems.

Third, though no gender difference in the incidence of disease may be detected, there could well be gender differences in the duration and intensity of treatment. (McNeill, 1986b in Tamil Nadu confirming Chen *et al,* 1981 and Koening and D'Souza 1986 in Bangladesh).

Fourth, if data for morbidity is collected from 'causes of death' data available in hospitals and/or primary health care centres in certain countries[18], its accuracy depends on the expertise of the recorder (Harriss, 1993), system of classification used and the concepts of illness and death of those reporting (Harriss, 1991). Further it can only be employed for inferences about morbidity if it is assumed that sickness follows the same gender and age distribution as death (Harriss 1993)[19].

Fifth, the sex bias in morbidity does not operate in a simple and consistent manner and therefore could give misleading impressions. This is confirmed in an interesting analysis of eye disease (Cohen 1987). Male infants from richer households were found to have a higher incidence of iatrogenic loss of vision than females or males from poor households, due to the use of harmful steroid eye cream. Similarly xerophthalmia common in infants and pre-school children and resulting from Vitamin A deficiency afflicts males up to 1.7 times as frequently as females. Paradoxically, food behaviour which assigns "cultural superfood" to male weanlings during the post-neonatal period while keeping females fully breastfed, may be the source of deprivation of Vitamin A.

1.3 The impact of poverty

This section summarises the findings of some studies investigating the impact of poverty on gender differences in mortality (Section 4.3.1) and morbidity (Section 4.3.2).

1.3.1 *Impact on mortality*

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[18] In India such data are available from the medical certification of deaths (urban areas) and the "causes of death (rural) survey" which is a lay-reporting survey, carried out annually in a random sample of block-headquarter villages throughout India (Chatterjee, 1990).

[19] 'Causes of death' data may also be interrogated for gender specificity to gain information on differential mortality. In India one of these causes, 'death by social cause' appears to be an euphemism for infanticide, a gross crime perpetuated almost always on female infants and neo-nates. These have been mapped by Chunkath and Athreya (1997) prior to activating social awareness against such discrimination. Similarly such data has been used to draw inferences about bride-burning. While these are dramatic indicators, they are highly politically sensitive and far from universally available.

Conclusions of studies investigating the relationship between poverty and gender bias in child survival differ. Two contradictory arguments about class position, poverty and mortality implicitly inform such studies. One is that the relative economic value of women is highest and patrilineal control over poverty is lowest among the assetless poor, so that, *ceteris paribus*, less gender bias would be expected (Harriss, 1991). Warrier's Purulia study would lend qualified support to this position (Warrier, 1987) as do findings of less intense female discrimination in poorer households by Murthi *et al* (1995) and Krishnaji (1987). The opposite arguments are that it is among the poor that both the opportunity cost of health care in terms of income foregone and actual costs incurred are relatively the greatest, that under conditions of food scarcity females are discriminated against in order to preserve the patriline, and that it is amongst the poorest that any given level of discrimination is most likely to translate itself into mortality. Dasgupta's (1987b) and Wadley and Derr's (1987) evidence and Warrier's (1987) Medinipur case lend support to these hypotheses. Other studies suggest that material and cultural determinations of mortality as an aspect of reproductive strategy may cut across class and income (Dasgupta, 1987b; Visaria 1987). Such poverty may therefore not be a major determinant of gender-differentials (Harriss, 1990 and Chen *et al*, 1981 and Dasgupta, 1987a cited in Murthi *et al*, 1995). The relationship between poverty and gender differentials in mortality is therefore not clear-cut.

1.3.2 *Impact on morbidity*

As with mortality, the interaction between gender differentials in morbidity and poverty is not straightforward. If the sexual geography of hygiene were common to all members of a locality, then patterns of exposure to certain diseases would not be expected to be related systematically to the economic status of households. Further, specific aspects of morbidity often show counter-intuitive trends. For example, the case of eye disease given earlier (Section 4.2).

1.4 **Summary**

Indicators of differential mortality and differential morbidity were assessed for their ability to reliably enable the identification of gender differentials in the functioning 'being healthy'. The findings are summarised as follows.

- **Mortality.** Indicators are relatively easily measurable and economically affordable. Certain country censuses provide information used to construct the indicators. The reliability of some, for example life expectancy, is questionable as it can mask gender differentials in specific age groups. Amongst the age-specific indicators, juvenile sex ratios (particularly disaggregated into FMR04 and FMR59) appear to be reliable and of greatest relevance to developing countries.
- **Morbidity.** Reliable indicators are difficult to construct due in turn to the inherent unreliability of the underlying data (hospital records, questionnaires etc.).
- **Poverty.** Evidence on the relationship between poverty and gender differentials in mortality is conflicting. While some suggest that there is no link, others suggest higher differentials either in richer groups or poorer groups. The question always requires answers which are grounded empirically. No *a priori* generalisations are possible. Differentials in indicators of the functioning 'being healthy' do not therefore essentially conflate with differences in opulence indicators.

2. Being educated

The assessment of gender differentials is relatively more straightforward with regard to education than to health. Unlike mortality, the education potentials of men and women do not differ[20]. Further data related to education (for example enrolment rates, mean years of schooling) do not suffer from constraints of subjectivity like morbidity data.

Indicators for assessing male-female differentials in education can be broadly divided into two groups - indicators of access or participation and indicators of content and purposes (UNESCO: Third World Education Report, 1995). The first are more relevant to developing countries where access could be unequal even at primary levels. The second are mainly concerned with gender differences in the nature and content of education provided. These are relevant to developing as well as developed countries. The indicators discussed are shown in figure 2.

Figure 2 Indicators of 'being educated'

[20] Differences in education potential of men and women have not been conclusively shown to be different. There are a number of questions in educational psychology about the issue of gender bias in test instruments themselves - the need to distinguish between an 'ability' and the performance of the task designed to measure it. Without such a distinction, tests could simply confirm existing prejudices. (UNESCO, 1995).

2.1 Indicators of access

These are concerned with access to education right from basic literacy to tertiary education. Indicators of access are further sub-divided into stock variables (adult literacy, mean years of schooling) and variables of flow (enrolment and drop-out rates). These are discussed in turn below.

2.1.1 *Stock variables*

Stock variables give information about the older members of the population. Adult literacy refers to persons (15 years and above) who can with understanding read and write a short simple statement on everyday life (illiteracy refers to those in this age group that cannot). The literacy rate of women is significantly lower than that of men in 66 countries (a third of the membership of the United Nations). According to UNESCO, "few other indicators capture as decisively the imbalance in the status of men and women in society as does this simple measure" (1995). These rates have however been criticised for being self-reported and hence inaccurate. Another problem is the definition used. If defined only with respect to a major national language(s), it can result in under-estimation (UNESCO, cited in King and Hill, 1993).

The other stock variable mean years of schooling is the average number of years of schooling received per person aged 25 and over. It overcomes some of the problems associated with the literacy variable. Both variables however reflect past investment and access to education. Recent progress could be better captured by looking at changes over time in sex differentials in flow variables detailed in Section 5.1.2 This is particularly important in developing countries where younger age groups constitute a larger proportion of the population.

Before proceeding to discuss flow variables, it is important to be aware that when assessing any of the variables, the use of indices is preferred over that of percentage values. This is because the latter can be deceptive (UNESCO, 1994) [21]. As an illustration, see Table 3 (based on UNESCO, 1994). The table shows gender disparities between male and female illiteracy rates for 1970 and estimated disparities for 2000, by region. Disparities are expressed in the columns 2 and 3 as percentages and columns 4

[21] This is a point of general concern which applies to all the variables discussed in the paper.

and 5 as indices. On comparing 1970 and 2000, in columns 2 and 3 gender disparities appear to be diminishing in percentage points in most regions. The indices in columns 4 and 5 however suggest that the gender gap will actually widen in all regions except Latin America.

Table 3: Comparison of indices and percentages to assess gender disparities in illiteracy rates

Region	**female minus male illiteracy rate (%)**		**nos. of illiterate women per 100 illiterate men (index)**	
	1970	2000	1970	2000
(1)	(2)	(3)	(4)	(5)
Sub-Saharan Africa	9.3	20.6	129	169
Arab States	25.8	22.5	143	184
Latin America or Caribbean	7.4	2.4	133	123
East Asia or Oceania	28.6	14.6	187	246
South Asia	27.9	25.0	151	174

Source: UNESCO, 1994 Table 2

2.1.2 *Flow variables*

These include enrolment and drop-out rates at the primary, secondary and tertiary levels. Since wide gender gaps exist in access even at the primary and secondary levels, these levels are of major concern here. Issues related to differentials in the nature and content of education are more relevant to the tertiary level. The tertiary level will therefore be dealt with in Section 5.2.

The female/male participation ratio (i.e. female gross enrolment ratio divided by male gross enrolment ratio)[22] at the primary level is a useful measure to assess the gender gap in countries which have not yet achieved universal primary education. In those that have,

[22] The gross enrolment ratio for any level is the total enrolment in that level, regardless of age, divided by the population of the age-group which officially corresponds to that level. The net enrolment ratio only includes enrolment for the age-group corresponding to the official age group for that level. The distinction is important because enrolments could include large numbers of over-age children as for example in primary schools in sub-Saharan Africa, the Arab states and Southern Asia.

secondary enrolment rates can be utilised. There is some concern however that participation rates could mask other important measures. For example if a large number of enrolled students leave school before completing, it is important to know the proportion of boys or girls that drop-out[23]. In order to resolve the issue of which was more important (enrolment rates or drop-out rates), UNESCO (1995) used two indices, the school life expectancy and the school survival expectancy. School life expectancy is defined as the total number of years of schooling which the child can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular future age is equal to the current enrolment ratio for that age (UNESCO, 1995). The school survival expectancy is basically the school life expectancy for those persons *already in school*. Using these two measures the UNESCO observed the following for developing countries. First, the school life expectancies of girls were somewhat lower than boys indicating that higher proportions of girls than of boys never got into school at all. Seventeen of the 52 developing countries included in the analysis however showed a slightly higher school life expectancy for girls than boys (particularly in the Latin American/ Caribbean region). Second, countries with the gap in school life expectancies most in favour of boys were generally those with low school life expectancies both for boys and girls (particularly in sub-Saharan Africa). Third, countries with a very low school life expectancy for girls showed less of a gap between the school survival expectancies of boys and girls than in their school life expectancies. The conclusion was that the main policy challenge in most of the poorest countries was less one of ensuring the retention of girls once in school than of increasing access by designing ways and means of encouraging parents to send girls to school in the first place.

2.2 **Indicators of content and purposes**

Differences in the fields of education girls and boys are enrolled in begin appearing at the secondary level and become more pronounced at post-secondary and higher levels (UNESCO, 1995). This phenomenon is common to developing as well as industrial countries [24]. Every country for which data are available to UNESCO, shows a female

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[23] Hyde, 1993 uses the term wastage in the context of sub-Saharan Africa. This includes grade repeaters i.e. children held back for poor performance as well as drop-outs i.e. children who leave school before completing a cycle of primary school education and do not re-enrol.

[24] A number of reasons could be playing a role for such segregation in fields. In some cases there may be actual restriction of opportunities offered by the education system for access to particular fields of study. In others social convention may constrain the supply of female students. Possibly a

share of enrolment in the natural sciences, engineering and agriculture that is less than the female share of total enrolment in all fields. The opposite tendency is apparent in the humanities.

The UNESCO developed an index to assess the extent of such gender segregation (statistical notes, UNESCO, 1995). This Gender Segregation Index gives the percentage of persons who would need to change their fields of study for a 'balanced' distribution of the sexes among the fields to be achieved (i.e. one where the ratio of females to males is the same in all fields). Low percentages indicate a low degree of segregation or gender-specific specialisation. Conversely high percentages indicate a high degree of segregation of the sexes. Calculation of the index for Bangladesh indicated that 1% of those enrolled in third level education would need to change the field of study. The corresponding figure for Finland was 23%. This appears to indicate that there is less gender segregation in higher education in the former than the latter. The figure obtained however conceals the fact that there are proportionately fewer females in higher education (16% of total students) in Bangladesh. The proportion of females in the different fields are close to the overall percentage of 16. In case of Finland however, females are (more) proportionally represented in higher education but under-represented in certain fields for example natural sciences, engineering, and agriculture. To obtain the full picture therefore differential tertiary enrolment rates must also be assessed together with the Gender Segregation Index.

2.3 **Impact of poverty**

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combination of both. Further perceptions of the compatibility of the careers based on different subjects with future marriage, household responsibilities and child-rearing are probably important in girls' attitudes and motivations towards different fields of study. Even in industrial countries women retain the primary responsibility for child care and household management. This affects both the kind of employment they are willing to accept and are likely to be offered. Therefore expectations and preferences concerning the nature of future employment are likely to influence the choice of fields girls make at the tertiary level (UNESCO, 1995). Some studies investigate the question of differences in ability (whether females are better suited to particular fields and similarly in case of males). There are however a number of problems with assessment which is widely open to prejudice and misunderstanding (detailed in UNESCO, 95). It is therefore difficult to reach any firm conclusions. In any case, ability is obviously not the only factor responsible for gender segregation (UNESCO, 1995).

Given social conventions and certain perceptions, the scope for disagreements when translating a differential in higher education enrolment and segregation in education fields, into a differential in well-being, could be greater than for differentials in 'being healthy', 'being nourished' or for 'being educated' at the primary or secondary level.

The UNESCO report looking at the relationship between National Income and education, reached the conclusion that while gender gaps in access are low in rich countries, gender gaps are not necessarily wide in all poor countries. The poorer countries with a GNP of less than US$500 per caput (1992 figures) showed a range of female-male participation ratios in the primary level of education which varied from under 50% for girls to nearly 100% for example Guinea 47%, Benin 50%, Kenya 98% and Rwanda 97%.

Since gender gaps in education are maximum in sub-Saharan Africa (a majority of countries with lagging female enrolment rates in the primary level are in this region) and in South Asia, we concentrate on micro-level studies in these regions. Micro-level research reveals poverty is related with lower education in girls (Rozensweig, 1980 for India; Ahmed and Hasan, 1984 for Bangladesh cited in Khan, 1993 and Assie, 1983 for Cote d'Ivoire; Weis, 1981 cited in Hyde, 1993). Educational advantage conferred by high socio-economic status was found to be even more pronounced at the university level (studies reviewed by Hyde, 1993). The generally accepted conclusion is that family poverty in rural and urban areas is probably the most important reason for holding girls back from school or withdrawing them earlier, often reinforced by other factors.[25]

2.4 **Summary**

The findings of Sections 5.1–5.3 can be summarised as follows.

- **Indicators.** The most important indicator of gender gap in developing countries appears to be enrolment rates. In countries where primary education is universal, enrolment rates for secondary school could be used. For some developing countries for example in Latin America/ Caribbean, enrolment is universal at all three levels. It is then important to look at the gender segregation index.

[25] A number of factors underlie gender gaps in education. Khan, 1993 reviewing studies in South Asia identifies factors such as social and religious conservative norms, basic amenities in schools (such as lavatories), rigid time schedules, the demand for girls to take care of siblings and do household and farm work. Similarly Hyde's review of sub-Saharan Africa identifies negative parental and community attitudes towards the Western education of girls, the desire to protect girls, the poor quality of schools, constricted curriculum choices for girls, marriage and child-bearing which compete with school for older girls, and demand for girls to work at home and the fields (Hyde, 1993). Further the review identifies unfavourable labour market opportunities with girls employed in trade and informal sectors and therefore requiring to learn from mothers and apprentice with older women, while boys have a higher opportunity to enter formal labour markets after education.

- **Poverty.** Family poverty in rural and urban areas is probably the most important reason for holding girls back from school or withdrawing them earlier.

It is worth noting here that it appears contradictory that sub-Saharan countries with their balanced FMRs should show the widest gender gaps in education right from the primary levels. Perhaps the same factors that are considered responsible for their getting a better deal in nutrition and health care (reflected in balanced FMR) are responsible for their lack of enrolment in school, i.e. the higher economic worth of girls and women due to high participation in agriculture and rural trade. Further, when women work in the fields, young daughters would be required to take care of siblings and other household reproductive work.

Gender gaps in education in sub-Saharan Africa highlight the importance of not relying on a single indicator. Equality in one dimension of human functioning (for example, 'being healthy' in sub-Saharan African countries as reflected by the balanced FMR) may not necessarily be accompanied by equality in others. The issue of composite indices to obtain an overall picture of well-being is the topic of discussion in Section 7.

3. **Being nourished**

Indicators used to assess the state of nutrition are commonly divided into two groups - indicators of intake and indicators of outcome. These are discussed in Sections 6.1 and 6.2. Before this however, some basic terminology is outlined below (details in McNeill, 1985).

In order to survive and function, every human being (and animal) requires *energy* (measured in calories). This is obtained from the constituents of food - namely, carbohydrates, proteins and fats (together referred to as *macronutrients*) which also perform other specific roles. The body is in *energy balance* when the energy input (derived from the macronutrients) is equal to the energy expended (for maintenance of the *status quo* and physical activity)[26]. In addition to energy, adequate levels of *micronutrients*, namely vitamins and minerals (in small quantities) and fibre are required.

[26] Svedberg, 1991 subdivides energy expenditure into the following components: a) to maintain internal body functions like cardiovascular and respiratory activities i.e. the basal metabolic rate (BMR); b) to increase internal body activities during waking hours like increased muscle tone and food digestion; c) external physical activity like manual labour; d) body's generation of heat (thermogenesis) and e) energy that leaves the body unutilised in the urine and faeces. Although BMR dominates most discussions, an additional component in children, which is quite big compared to others is growth.

Deficiency of any of the vitamins or minerals causes specific diseases, for example vitamin B deficiency causes beri beri and Vitamin C deficiency causes scurvy. Since the quantity of micro-nutrients required is very small, a diet which supplies adequate energy normally supplies adequate quantities of these as well (as it generally does with protein). In developing countries, micro-nutrient deficiencies usually occur in members of the population who have low total food intake and therefore also energy inadequacy. This paper therefore does not discuss individual nutrient deficiencies but restricts itself to energy inadequacy referred to here as *undernutrition*.

The two groups of indicators (intake and outcome) used to assess the state of nutrition are discussed below with particular reference to their role in assessing gender differentials.

3.1 Indicators of intake

In the dietary intake method, the calorie intake is calculated (normally by noting the consumption of food) and compared against that required for the individual to be in energy balance.

This is a commodity-based approach with the measurement of food consumption being an opulence criterion, rather than functionings-based. For example two persons of similar weight and performing similar physical activity may receive identical amounts of food. While one may be adequately nourished however, parasitic infection may interfere with food absorption in case of the other. Although the characteristics (nutrition) of the commodity (food) remain the same, the differing properties of the persons involved result in different functionings (being well-nourished and being under-nourished). Although a dietary intake indicator does not therefore rest comfortably with the functioning-based approach, it will be addressed briefly in order to highlight the problems facing the issue of nutrition assessment in general.

Some problems facing the dietary intake method concern the following:

- **Data collection.** This method requires an estimation of daily food intake (and the calculation of calories contained, using standardised conversion tables) which is time-consuming, expensive and prone to error. The methods commonly used to estimate food consumption are the following (Svedberg, 1991). First, recall (typically over 24 hours and preferably for seasonal sets of 24 hours) where people are asked how much of different kinds of food they have consumed over that period. People however tend to forget minor items or snacks, breast milk cannot be estimated by this method and the poor are likely to exaggerate their food intake, in order to hide their deprivation. The second method is measurement of changes in food stocks, and conversion of this into 'consumption' flows. The disadvantage again is that only main meals consumed at home are covered and breast milk is not accounted for. The third method is weighing the equivalent of the food actually observed to have been consumed over a fairly long period of a week or more. The method may also involve direct weighing before consumption or the copying by the researcher of portions (raw or cooked) using standardised estimates for the weights of known volumes. Errors may creep in the conversion factors between raw and cooked ingredients, in the measurement of portions and in the classification of ingredients (Harriss - White, 1997). Further, there is widely alleged to be a trade-off between efforts to obtain high precision and modification to behaviour on account of being observed (Abdullah, 1983). In all the above methods it is necessary to ensure that the consumption has been measured on 'normal' (i.e. not fasting or feast days) days and over seasons (to exclude the impact of exceptional events).

An additional disadvantage with particular reference to assessing gender differentials is to do with the methodology (measurements are most commonly made on households and rather rarely on individuals).

- **Fixing the norm**. Relating the intake to a presumed per capita requirement norm is fraught with a host of problems. A calculation of the required energy depends on three dimensions (i) energy requirement for the basal metabolic rate per kilo of body weight (ii) body size and (iii) work activity. The calculation of the 'norm' for each of these dimensions is in dispute.[27]

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[27] The issues under dispute with respect to each of these are discussed by Svedberg (1991) and are briefly outlined here. 1) Energy requirement for the basal metabolic rate (BMR) per kilo of body weight: The BMR could show inter-individual differences among individuals of the same sex, weight and age. Possible explanations are a) genotypic differences affecting the efficiency with which energy is metabolised; b) changes in body composition with increase in weight or even between individuals of same weight for example, different ratios of fat to lean tissue - the energy expenditure for the maintenance of fat stores being lower than for the sustenance of functions of lean tissue; and c) the controversial notion of adaptation to intake either by increasing energy efficiency or by reducing energy wasted by thermogenesis. Further under dispute is the form of relationship between BMR and body weight; whether BMR increases linearly with an increase in body weight or if the relationship is quadratic (concave). 2) Body size: Different body size norms could be used. One possibility is the use of the height and body weight of an average individual in an "observed" reference population (or a fraction thereof) which has adequate nutrition. The other is the average of an estimated range within which the weight can be changed without impairing

With reference to gender it is important to ensure that different norms are used for males and females. WHO estimates suggest that an average male expends 36% more energy per day than his female counterpart - due to differences in body weight (and therefore higher maintenance energy) and also in the proportion of metabolically active tissue per unit of body weight. Since females need less of most nutrients than males, an assessment based on absolute amounts of food, rather than relative to the different male/female norms, could result in errors of commission. Underestimating the work load of women, especially those involved in hard agricultural labour and heavy household work could result in biases in the calculation of norms. This could result in an underestimation of any existing female disadvantage (an omission error which is a more serious error).

- **Inter-individual variability.** Requirements at the individual level are difficult to asses owing to substantial inter-individual variability. Thus nutrient requirements based on averages for populations are abused if applied to individuals. For example half of a normally distributed population will have a less than average calorie (or any other nutrient) "requirement". In fact the FAO and WHO acknowledge these difficulties and suggest that their requirement norms not be used as cut-off points for estimating undernutrition at the individual level, but be used for "prescriptive" purposes only.

Indicators of intake thus appear to suffer from methodological (measurement on households) as well as inherent (data, norms, inter-individual variations) problems. The conclusions of studies investigating gender differentials differ depending on the assumptions made about intra-household distribution, norms used, the cut-off points as well as ungendered standards.

Studies assessing nutritional status using individual food intake measures done on the same data set could reveal contradictory findings. For example Harriss-White, 1997 compares 5 studies (Ryan *et al,* 1984; Behrman, 1988; Behrman and Deolalikar, 1989; Behrman and Deolalikar, 1990; Harriss, 1990). These studies were all carried out on the same nutrition database (from the International Crops Research Institute for the Semi-

health. The weight at the lower end of this range could also be used. 3) Physical activity: With regard to the physical activity of the reference individual, economic return of physical work differs substantially depending on the land, capital etc. owned. While international organisations base the norm on the "average" work activity, this actually differs for different people to enable them to survive economically and avoid undernutrition.

Arid Tropics - ICRISAT) which covers 200 individuals of all ages (except wholly breast fed babies) from 240 households in 6 villages from 4 agro-climatically different regions in the semi-arid tropics of India. Conclusions in all but Behrman's study ran counter to orthodoxy: the intra-household bias, if existing at all, was found to be against male children by Ryan *et al*, (1984) and against males by Behrman and Deolalikar (1989), whereas Behrman and Deolalikar (1990) reported a bias oscillating against and toward females according to supplies. Harriss (1990) found some village-specific scarcity bias which was significantly anti-children of whatever sex, some anti-adult male and some anti-female of whatever age. Age bias rather than gender bias was also found by Ryan *et al*., teenagers being most vulnerable.

Similarly contrasts exist in other published studies which are now dated. Consider two studies in Bangladesh (Chen *et al*, 1981 and Abdullah, 1983) where the sex ratio is highly masculine. Chen *et al's* conclusion was that male intake per caput exceeded that of females in all age groups. Abdullah (1983) however, made adjustments in male and female energy requirements from recommended allowances for age groups over 5. The conclusion of this study was that in ages above 5 there was no female discrimination (beyond that accounted for by male female differences in body size, activity and physiological differences). This contrast in results highlights the importance of ensuring that the gendered norms are used for males and females. A review by Wheeler (1984) similarly concluded that there was no evidence of discrimination against women in the intra-household allocation of energy intakes (relative to energy requirements) in South Asian populations (cited in Gillespie and McNeill, 1992).

Published studies in sub-Saharan Africa with regard to gender differences in intake are extremely few. Schofield's (1979) findings drawn from 11 African villages suggested that there was no statistically significant difference between fulfilling established calorie requirements between males and females – adult males fulfilled 101% and adult females 96% of the requirement (cited in Svedberg 1990).

3.2 **Indicators of outcome**

Three types of indicators are used to assess the outcome of calorie intake - biochemical, clinical and anthropometric. The first two may not be useful at early stages of undernutrition or when energy shortage is not accompanied by micronutrient deficiencies or illnesses. Data is patchy and interpretation of causality is not straightforward as there may be reasons other than undernutrition for these clinical signs and symptoms and biochemical findings. Further the number of clinical signs and symptoms is large (up to 36) involving difficulty in diagnosis. Svedberg, (1991) gives the example of a study where two experienced, well-trained experts examining the same population for clinical signs of malnutrition were in agreement in less than half of them as to which signs did and did not occur. Biochemical assessments apart from being expensive and time-consuming are largely used to detect isolated mineral and vitamin deficiencies.

Anthropometric measurements are the most commonly used of the outcome measures. The measurements considered most relevant by nutritionists are height and weight. More specifically, children are normally assessed using height for age, weight for height and weight for age ratios[28]. For adults the height and the Body Mass Index (weight for height square) are used. Svedberg (1991) expresses very succinctly the reasons for the popularity of the use of anthropometric measurements: "the anthropometric approach rests on the presumption that people's physical appearance reflects their nutrition (and health) status, i.e. if their body intake and expenditure balance at too low a level, this will show in their body constitution. This means that neither energy intake nor the expenditure has to be measured. The anthropometric approach is therefore more direct and simple and less reliant on data collection than the dietary approach" (1991, p 191). Despite these advantages, some difficulties are as follows:

- **Fixing the norm**. As with indicators of intake, here too the issue of fixing the 'norm' is controversial. Most national and international studies use the norms established by the United States Centre for Health Statistics. Such norms are usually obtained from Western populations assuming that the average child here is on his or her genetic potential growth path and has a weight assumed to be optimal for health and various mental and physical capabilities (Svedberg, 1991). First, it is highly controversial as to whether these norms could apply to all populations. This issue could be avoided by using norms derived from the local population from amongst a well-fed group. In case gender inequality already exists in such a group however, using these norms would result in omission errors (Harriss-White, 1997). Further if age is given wrongly such

[28] Height for age is used as a measure of stunting and if low indicates chronic growth retardation; weight for height is a measure of wasting and if low is taken to be an indicator of recent or 'acute' growth retardation; weight for age is a measure of overall nutritional status and indicates both long-term and current growth retardation - if low it is referred to as 'underweight'.

norms could give misleading results - for example, the overstatement of a girls' age could mean that anthropometric measures could erroneously suggest that she is undernourished. Where women lie about the age of the daughter saying she is younger (as is alleged to happen commonly in Asia), shortfalls could pass unnoticed.

Second, a child would be classified 'undernourished', if he/she fell below some cut-off point below the mean of the reference population[29]. Opinions vary on choosing the 'cut-off' point (Svedberg, 1991). For example with regard to height for age, cut-off points vary from 10 per cent and two standard deviations below the median reference height to below the fifth decile in the reference population. Using different cut-off points, Mora (1984) showed that the share of children in a sample from Columbia that were classified as wasted or stunted was almost twice as big depending on the cut-off point used (cited in Svedberg, 1991). Setting the cut-off close to the reference median would give high commission and low omission errors and vice versa.

It is also often forgotten in interpretation that in a normal distribution, a certain proportion of the population will be healthy at, and below the cut-off; just as a proportion will have poor nutritional status due to obesity above the cut-off.

- **Adaptation.** The issue of adaptation is still unresolved. Briefly, if food intake in a particular region/population/gender is lowered the body could adapt in a number of ways (physiologically, behaviourally and metabolically) with costless adjustments to body size. While there is no disagreement about the fact that such adjustments cannot proceed indefinitely, there does not appear to be any agreement as to the level of the crucial cut-off point below which adjustment impairs health (Svedberg, 1991).
- **Multicausality**. Anthropometric measurements are not just the outcome of nutrition. They are also affected by the availability of health care, the 'public health' environment and the prevalence of infections. For example, infections in the first 24 months have consequences for height trajectories, in particular growth deviations, which are now thought to be irreversible (Payne and Lipton, 1994). Height deficits relative to standards are often interpreted as indicators of chronic disadvantage, though

[29] This is a simplification. If a child reacts to nutritional stress by first reducing physical activity below the critical level, the child could be undernourished although anthropometric indicators remain normal. Svedberg, 1991 discusses in Section 10.2 p 244 whether a low anthropometric score is a necessary and/or sufficient condition to label an individual as undernourished.

they may be more accurately attributed to disadvantage in infancy (Harriss-White, 1997). In terms of assessing gender differentials, the fact that anthropometric measurements could reflect multiple disadvantages could be seen as an asset in an indicator. The other controversies which give rise to different results depending on norms and cut-offs used (as discussed above) however greatly reduce their value.

Using anthropometric measures has the advantage of being measurable and not reliant on recall or self-reporting. Measurements are made on individuals. Intra-household differences in nutritional status of individuals, for example, between males and females can therefore be assessed. Despite these advantages over intake measurements, outcome measures are prohibitively expensive and require more skill than for example, census enumeration data used to collect mortality statistics. Besides, they could be unreliable giving rise to errors of commission or omission depending on the norms and cut-offs used.

As with the dietary intake approach, the following studies which use anthropometric outcome measures fail to arrive at a consensus on the issue of gender differentials. Chen's (1982) study in Bangladesh on children under 5, identified gender differentials in all three anthropometric indicators (weight for age; weight for height and height for age). 14.4% of the girls showed severe malnourishment (in the weight for age indicator) compared with 5.1% of the boys and 59.9% of the girls were moderately malnourished compared with 54.8% or the boys. Abdullah's (1983) longitudinal study also in Bangladesh on a smaller sample however gave no clear gender differentials in anthropometric indicators for this age group. In fact, socio-economic factors were found to be more important than gender in determining nutritional status (cited in Watson and Harriss, 1985).

Again there is no direct relationship between sex ratios and anthropometry in National nutrition surveys in Nepal and Sri Lanka. This was supported by Martorell, *et al* (1984) who found no difference between boys and girls in the degree of growth retardation in the Terai region of Nepal. Sri Lanka with a higher sex ratio than Nepal however, in a national nutrition survey showed an anthropometric difference between girls and boys under 5 in the height for age indicator in 10 of 12 districts (Perera, 1983 cited in Watson and Harriss, 1985).

Findings in sub-Saharan Africa are similarly controversial. In a study of data on more than 50 populations in the region, Svedberg (1991) concluded that females irrespective of their age, were not at a disadvantage *vis-a vis* males in anthropometric status. Klasen (1996) however questions this evidence and presents data showing an anti-female trend. Controversies on the consistency of findings due to problems with norms and interpretations are well-highlighted in the published correspondence between Klasen (1996) and Svedberg (1996).

Our view that findings on gender differentials in nutritional status (assessed by both approaches) are inconclusive is shared by Basu (1993). Basu's thesis is that most research in this area starts with the biased view that gender differences in nutritional status must exist. She looks at primary data as well as critically reviewing existing literature on sex differentials in childhood nutritional levels in South Asia. She suggests that the evidence on the relatively greater nutritional deprivation of girls in South Asia "is inconclusive at best and possibly even conclusive in a direction which suggests that, in access to food, daughters and sons do not really stand very different chances".

3.3 **Impact of poverty**

Few studies of nutritional status have investigated the gender differential by class. Three studies in India (Levinson, 1972; Sen and Sengupta, 1983 and McNeill, 1984 cited in Watson and Harriss, 1985) found that anthropometric differences in the two sexes were specific to social class. Differences between the sexes disadvantageous to women were greatest in 'the poorer Ramdasia caste (Levinson) the poorer landless caste (Sen and Sengupta) and the poorest socio-economic group (McNeill) than in the corresponding Jat landowning class, the landed castes and the population as a whole. The results suggested that the intensity of nutritional discrimination against females was greatest in the poorer socio-economic class. In contrast to this, Ryan *et al*'s (1984) anthropometric research on the ICRISAT database showed gender differences confined to the children of landless and small-farmer households where it was boys rather than girls who were at a disadvantage. The tribals in Andhra Pradesh studied by Gillespie (1988) showed gender bias in anthropometric status which favoured boys below 12 months and favoured girls between 12 and 60 months. Rather than income poverty at the household level, it was the participation in the labour force of the mother that was most closely and significantly associated with malnutrition. The author suggests that increased income from labouring is offset by reduced time for child-care and feeding in an agrarian regime where peak labour and peak disease incidence coincide.

As with anthropometric indicators, the relation between low calorie intakes and income poverty is not clear-cut. A documentation of 24 methodologically unstandardised micro-level studies of individual nutrients intake in India and Bangladesh revealed the following. First that nutrient intake *per se* is not a good indicator of gender poverty. Second, that there did not appear to be a systematic age or gender bias (across villages within a region, even with respect to the landless class) with unambiguous implications for policy (Harriss, 1991). Miller (1997) in an extensive review of 14 studies (of intake and anthropometric measurements) extending from the North-Western plains area of the Indian subcontinent to the Himalayan region, the Eastern plains and the South however concludes that a relationship between poverty and food allocation differentials exists, but in a counter-intuitive direction. Female disadvantage in food allocation was found to be more apparent in the propertied strata rather than the lower strata - particularly in the Northern plains. As an explanation for this, she draws on the "poverty aversion" approach which "takes into account the social fact that raising many daughters within the North-Western plains socio-economic context, will indeed impoverish a family, while sons will enrich a family" (Miller, 1997 p1692).

3.4 Summary

The findings in Sections 6.1–6.3 can be summarised as follows:

- **Unreliable indicators.** Measurements and calculations of food intake and outcome suffer from a number of methodological and inherent problems which make it difficult to construct reliable indicators.
- **Poverty.** Assessing the true impact of poverty on gender differential is confounded by the absence of good indicators. Using the existing indicators, studies show contradictory findings. It is not obvious that differentials in nutrition would always conflate with differentials in opulence indicators.

4. Composite assessment

While differentials in well-being in each functioning can be assessed separately as in Sections 4 — 6, we now turn to the issue of whether a composite assessment can be obtained by accounting for the extent in differences in each functioning. Attempts at framing indices reflecting such composite assessments are not new. More recently indices of human development have been developed by the Human Development Report team (HDR) of the United Nations Development Programme. The Human Development Index (HDI) which was reported in 1990 was followed by other indices namely, the Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM); the Human Freedom Index, the Capability Poverty Measure and in the most recent report (1997), the Human Poverty Index. It is conceivable that the methods used in developing such indices could be extended to combine the indicators of health and education described earlier. We leave this as an interesting exercise to be pursued, and concentrate here on existing composite indices relevant to the issue of gender inequality *viz.* the GDI (and its precursor HDI) and the GEM.

4.1 The Human and Gender-related Development Index

The Human Development Index (HDI) was designed to focus on three essential dimensions of human functioning - longevity (or 'being healthy') measured using the indicator life expectancy at birth; knowledge (or 'being educated') measured by the indicators adult literacy and average primary, secondary and tertiary enrolment; and access to resources to enable a decent living standard measured using the indicator per capita income adjusted for purchasing power parity (PPP) [30]. Normalised values (indices) for indicators are obtained and averaged to give the HDI. This is thus considered a reflection of the combined well-being in the dimensions assessed and gives a value on a scale between 1 (maximum development) and 0 (minimum). Of particular interest to this paper is the Gender-related Development Index (GDI). The GDI could be considered

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[30] Details of the calculation of the HDI can be obtained form technical Note 2 in HDR, 1997. A brief explanation follows here. For calculating the HDI, values for each component are first normalised to give an index. The general formula for the index X_i for each dimension i (i = 1 for longevity, i = 2 for education and i = 3 for income) for a country is as follows:

$$Xi = (\text{actual } x_i \text{ value} - \text{minimum } x_i \text{ value}) / (\text{maximum } x_i \text{ value} - \text{minimum } x_i \text{ value}).$$

Each indicator has the following fixed minimum and maximum values a) Life expectancy at birth 25 and 85 years b) Adult literacy at 0% and 100% and the average enrolment ratio at 0% and 100%. The education attainment index is given by combining the two with a weightage of 2/3 for adult literacy and 1/3 for combined enrolment. c) Real GDP per capita (PPP) at PPP$100 and PPP$6154. The maximum is actually 40,000$ but any value above the world average GDP of PPP$5835 is discounted using a form of Atkinson's formula (details are given in technical note 2, HDR, 1997). Thus the maximum is reduced to PPP$6154.

Having normalised the values of each indicator on a 0 - 1 scale, the value of the HDI is obtained by averaging the indices for the 3 dimensions. Each index is given an equal weightage. Thus:

$$HDI = (X1 + X2 + X3)/3.$$

as a special type of HDI which takes note of inequalities between any two groups. The two groups considered here are male and female (the same index could however be used to assess the inequalities between groups of different castes or different ethnicity, etc.)[31]. The GDI is simply the HDI which is discounted or adjusted downwards for gender inequality.

The HDI and GDI have been designed for comparisons between countries at different stages of development[32]. If the GDI is to be used specifically in developing countries, certain adaptations may be required. Considering adaptations pertaining to each component of the index in turn:

- **Longevity**: This component reflecting the functioning 'being healthy' is measured by life expectancy which was selected over other suggestions like infant mortality rate and potential lifetime (Desai, 1989 cited in HDR 93). This was because the IMR and potential lifetime were not able to distinguish between industrial countries. However, for our purpose of assessing well-being within developing countries an indicator relating to mortality rates in younger age groups would have to be used. Further life expectancy at birth has little or no value as a measure of gender differentials. As discussed in Section 4, FMR04 and FMR59 are more appropriate indicators of the

[31] Details on measurement of GDI can be found in technical note 2 in HDR, 1995. Briefly, the 3 dimensions assessed in the GDI are the same as the HDI. The main difference is that the HDI is concerned with overall achievement. The GDI however takes into account the extent of gender-inequality. Indices for the 3 dimensions are therefore calculated separately for male and female i.e. X_f and X_m. These are then combined to give a gender-equity-sensitive indicator (GESI), calculated by = $(p_f X_f^{1-\varepsilon} + p_m X_m^{1-\varepsilon})^{1/(1-\varepsilon)}$ where X_f and X_m = corresponding male and female indices obtained by applying the Xi formula given in footnote 30 above to male and female indicator values separately; p_f and p_m = corresponding male and female proportion of the population. ε can be considered a measure of aversion to gender inequality, which can be altered anywhere between 0 and ∞. 0 indicates that there is no aversion to gender inequality (the HDI implicitly assumes ε to be 0; when $\varepsilon = 0$, an *arithmetic* mean of male and female achievements is obtained). If the $\varepsilon = \infty$, this indicates a very high aversion to gender inequality such that only the achievements of the group with the lower value, typically females, are considered while those of men are ignored. The GDI however uses a $\varepsilon = 2$ which expresses a moderate aversion to inequality. This is an arbitrary decision and the value can be altered depending on the degree of aversion the state decides on.

There is an additional difference between the HDI and GDI with reference to the income indicator. For the purposes of the GDI the shares of earned income for women and men are derived by calculating their wage as a ratio to the average national wage and multiplying this ratio by their shares of the labour force. Their shares of earned income are then divided by their population shares. This gives the two proportional income shares. The GESI is then obtained as explained above by combining the female and male indices (X_f and X_m.). This value is then multiplied by the average real adjusted GDP per capita of the country. This gives a measure of GDP per capita that is now discounted for gender inequality. This is the Actual (x_i) value used when calculating the index Xi for income as in the previous footnote. The GESI indices obtained for the longevity and knowledge are then combined with the Xi for income. The average of the 3 indices gives the GDI.

[32] Technical note Table 2.4 in HDR, 1993 makes some suggestions for using different indicators to measure the 3 dimensions of the HDI for countries at different stages of development.

functioning ('being healthy') that life expectancy proposes to capture. Some way of including the disaggregated FMR values in the index would need to be devised.

- **Knowledge**: This component reflecting the functioning 'being educated' is measured by combining the indicators adult literacy (2/3 weight) and mean primary, secondary and tertiary enrolment (1/3 weight). It has evolved from the first HDR in 1990 in which only adult literacy (the percentage of literate people above 15) was used (HDR, 1990). Since the adult literacy rate was unable to distinguish between industrial countries, mean years of schooling (average number of years of schooling received per person aged 25 and over) was added. Since a substantial proportion of the population in developing countries is under 18 and majority under 15, these stock variables were unable to capture the *flow* of educational attainment (Smith, 1992 cited in HDR, 1993). In response to these criticisms subsequently 'mean years of schooling' was replaced by 'average primary, secondary and tertiary enrolment'. As discussed in Section 5, this is a measure useful in developing countries as well as being sensitive to gender differentials and thus a useful component of the GDI. The 1/3 weightage given to the average enrolment measure however makes it subservient to the adult literacy measure. It would be worth investigating empirically whether a reversal of weights - such that adult literacy accounts for 1/3 and the average enrolment for 2/3, would be more appropriate for use in developing countries.

- **Income**: For the purposes of the GDI the shares of earned income for women and men are derived by calculating their wage as a ratio to the average national wage and multiplying this ratio by their shares of the labour force. Any differential in the income indicator therefore relies on two important differentials - the ratio of female wages to male wages and the female to male ratio of the labour force. The income indicator does not aim to reflect women's access to income for consumption or other uses, as women who earn money may not have any control over it within the household. In other cases women who do not earn income may control what is earned by male members of the household. Rather, the income variable is used in the GDI because it reflects a family member's earning power, which is an important factor in economic recognition, independence and reward (HDR 1995)[33].

[33] The issue here therefore is of including income from waged work. Criticisms (for example Prabhu *et al* 1996) about inclusion of unpaid work are important. The information captured by such an indicator would however be different to that which the 'earnings' are expected to capture.

Sen, proposes three ways through which a womans' outside earnings ultimately contribute to well-being. These are first by strengthening her bargaining position in the household, second allowing her to have higher claims due to a higher perceived contribution to the family's economic position and third possibly giving her a clearer perception of her individuality and well-being (Sen, 1990). Outside earnings also positively influence the care that female children receive in comparison to male. Table 4 from Sen (1990) gives comparative data for 5 major regions. The table shows the relationship between women's earnings, represented by female to male activity rate ratios (activity ratios represent the proportion of total population of each sex involved in economic or gainful activities) and well-being (life expectancy - is taken by Sen to be the reflection of well-being). The rankings for the two measures (activity rate ratios and life expectancy ratios) are very similar.

Table 4 Comparison of female-male activity rate ratios and life expectancy ratios

Region	Activity rate ratios 1980 (female/male)		LE ratios 1980 (female/male)	
	Value	Rank	Value	Rank
Non-North Africa	0.645	1	1.071	1
East and Southeast Asia	0.610	2	1.066	2
West Asia	0.373	3	1.052	3
South Asia	0.336	4	0.989	5
North Africa	0.158	5	1.050	4

Source: Sen (1990), calculated from country data obtained from ILO (1986) and United Nations' "Estimates and Projections of Population" tapes.

Table 4 which corroborates the results of micro-level studies, suggests that benefits of wage earnings or penalties of not earning would ultimately be reflected in well-being. This is especially the case in developing countries where inequalities persist even in essential functionings. Since the GDI can and does include indicators of functionings, the income component does not appear to add any further information in case of developing countries.

The income indicator could in theory play a role in providing inherent information over and above that related to functionings. For example, given equal productivity holding all other aspects constant, a lower wage rate for women for jobs standardised for skill, is a clear indicator of overt discrimination. But the wage ratio part of the income indicator in the GDI is not standardised by skill which makes it ambiguous to interpret[34].

An exercise worth pursuing would be to replace the present income indicator by a 'drudgery' indicator which captures the differential in the number of hours (paid and unpaid) that males and females work. The inherent information that this provides

[34] The income component also has other shortcomings acknowledged in HDR, 1995. For example, assumptions that gender differentials in wages in the agricultural sector are similar to those in the non-agricultural sector and the exclusion of income disparities based on non-labour resources, such as land or physical capital due to data shortage.

could be seen as important in itself, rather than the conventionally proposed use to reflect the true economic contributions of males and females. In groups where differentials exist in the number of hours of work (intensity of work being similar), a translation into differentials in well-being would be apparent. Problems with the collection of data could however prove to be major impediments.

Recall that the components of the GDI were not chosen with the precise intention of assessing gender differentials. Rather, components of the HDI were retained, so as to give an index which was able to combine information about the level of human development with that of gender differentials in well-being. If the prime purpose is assessing gender differentials as in this paper, it would be expected that other indicators would be preferred above those currently incorporated in the GDI.

As mentioned above, the GDI value gives information about the level of overall development (HDI) discounted for gender inequality. To assess the extent of gender inequality therefore, it is misleading to look at the GDI value alone. For this it has to be compared with the HDI value. This Gender Inequality Value can be obtained by the following formula: [(HDI-GDI)/HDI] x 100 (HDR, 1995). For example consider Tanzania which has a GDI value of 0.352, on the 0 –1 scale (HDR, 1997). It would be wrong to conclude from this that the country has a large gender differential due to its low GDI value. Its HDI value is 0.357 and Gender Inequality Value is 1.4%. Compare this with Ireland with a 'high' GDI value of 0.851 and a 'high' HDI value of 0.929 . Despite higher overall development, Ireland's Gender Inequality Value is 8.4% reflecting a higher gender differential in the combined functionings of 'being healthy' 'being educated' and the 'income'. This is also apparent in Table 6 if Gender Inequality Rank and GDI rank are compared.

4.2 The Gender Empowerment Measure

A number of other composite indicators have been constructed and presented in the Human Development Reports recently. Though there may be gender equality in basic functioning vectors achieved, there could be inequality in taking advantage of other opportunities. The gender empowerment measure (GEM) has been formulated to assess such inequalities and examines whether men and women are able actively to participate in economic and political life and take part in decision-making. A discussion of this indicator of autonomy and power is beyond the scope of this paper.

4.3 Impact of poverty

Table 5 shows the distribution of gender inequality across income groups. The entries in the table are arrived at as follows. For each of the 145 countries for which data was available, the value (HDI-GDI)/HDI was calculated to obtain a measure of the gender inequality (HDR, 1995). Countries are placed in order of increasing inequality by this measure and divided into Low, Medium and High groups using the same proportion of approximately 1/3rd used by the UNDP for its HDI groupings. Similarly countries were placed in Low, Medium and High income (Real GDP PPP$) groups. Table 5 gives the number (and in parentheses the percentage) of countries corresponding to particular income and Gender Inequality levels. This reveals some interesting trends.

Table 5: Gender inequality versus GDP

			Income (Real GDP) PPP$			
			Low	**Medium**	**High**	**Total**
	Low	**(1)**	16 (30)	21 (39)	17 (31)	54
Gender	**Medium**	**(2)**	19 (35)	16 (30)	19 (35)	54
Inequality	**High**	**(3)**	6 (16)	15 (41)	16 (43)	37
	Total	**(4)**	41	52	52	145

Source: Gender inequality value calculated using data from HDR, 1997

For both low and medium inequality countries (row 1 and 2), income appears to be evenly distributed. Of the countries with low Gender Inequality, 30% have low income, 39% medium and 31% high income. Similarly, amongst countries with medium Gender Inequality, 35% have low, 30% medium and 35% high income.

Countries with high gender inequality on the other hand appear to be more likely to be in the high/medium income group. In Table 5, amongst countries with high income (row 3), only 16% had low income while 41% had medium and 43% high income.

The above relationships are apparent in Table 6 which shows countries with the top 10 and bottom 10 gender inequality ranks compared with their income, GDI and HDI ranks. Countries with income ranks ranging from Norway with a high income (income rank 6) to Tajikistan with a low income (rank 150) are included amongst the top 10 gender inequality ranks (i.e. countries with low inequality). Countries with high inequality ranks are however included mainly in the medium and high income ranks. This latter result cannot immediately be interpreted as suggesting that all high income/medium incomes are associated with high gender inequality. This tally is influenced by a number of high income countries like Kuwait, Luxembourg, Bahrain, United Arab Emirates and Qatar (see Table 6).

Table 6 Gender inequality rank versus income, HDI, GDI ranks

Gender inequality rank	income rank	HDI rank	GDI rank	Country
1	21	10	3	Sweden
2	127	103	83	Armenia
3	138	110	93	Moldova Republic
4	150	115	96	Tajikistan
5	147	121	101	VietNam
6	9	3	2	Norway
7	78	69	49	Bulgaria
8	114	100	78	Uzbekistan
9	14	5	4	Iceland
10	139	134	112	Kenya
136	77	72	73	Ecuador
137	96	94	82	Paraguay
138	66	78	84	Syrian Arab Republic
139	29	43	56	Bahrain
140	22	55	64	Qatar
141	27	44	61	United Arab Emirates
142	65	82	92	Algeria
143	57	64	77	Libyan Arab J
144	102	126	117	Iraq
145	41	73	95	Saudi Arabia

Source: Gender inequality value calculated and ranked using data from HDR, 1997

Gender inequality ranks 1-10 are the top 10 with low inequality and ranks 136-145 are the bottom 10 with high inequality.

Quite often it is the female income component of the GDI which is very low and which in turn lowers the GDI value. For, example in both United Arab Emirates and Qatar female achievements are higher than male in LE as well as in education. But the percentage of female and male contributions to income are 10% and 90% in the UAE and 9.7% and 90.3% in Qatar. The GDI makes the normative assumption that diffeerentials in income reflect inequality or discrimination. Countries with high differentials in income therefore have high overall inequality ranks. Findings such as those in Table 6 are an issue of discussion in the Gender Empowerment Measure. They raise questions about the extent to which basic functionings are utilised by women towards taking advantage of other opportunities (like economic and political participation, decision making power and control over economic resources, as defined by the GEM).

5. **Concluding remarks**

This paper has been concerned with the reliability of some indicators to identify gender inequality in well-being. Well-being was assessed within the functionings approach developed by Sen. In this context, indicators related to the fairly elementary functionings of 'being healthy', 'being educated' and 'being nourished' were examined, as was the relation of poverty to gender differentials in each of these functionings.

Of the indicators of 'being healthy' reviewed here, the most useful from the perspective of gender disadvantage is the disaggregated juvenile sex ratio i.e. the FMR04 and FMR59. It is possible that indicators disaggregated as FMR02 and FMR39 would reveal sharper gender differentials. These age-specific FMR's are relatively easily measurable, ought to be made available by census authorities and are reliable. The most useful indicators of 'being educated' appear to be 'flow variables' (especially enrolment rates) rather than 'stock variables'. The Gender Segregation Index can give additional information in countries with universal primary, secondary and tertiary education. Morbidity and nutrition indicators seem to rate low on all counts. The assessment of gender sensitivity of indicators also reveals that it is important to assess more than one functioning. Assessing a single functioning can give the impression of equality even though there is inequality in other functionings (for example in sub-Saharan Africa some countries may show a balanced FMR but large gender gaps in enrolment rates). Restricting of assessment to a single functioning could also result in specific interventions in one area (for example improve want of female education) to the neglect of other underlying issues, thereby addressing a symptom not a cause.

While we have discussed the merits of a multidimensional approach to evaluation, the compression of multiple elements of a functioning vector into composite indices raises other issues. Components of composite indicators require to be assigned a weight (which could be arbitrary); they may need to be calibrated against other composite indicators to be interpretable (for example, the GDI against the HDI) and currently available composite indices (for example the GDI) may need adaptations for developing countries. With regard to the use of GDI, we have argued here that the following adaptations could be appropriate if the Index is to be used specifically in developing countries, and are worthy of further investigation: a) Replacement of life expectancy at birth in an appropriate manner by age-specific disaggregated FMR's (for the under 10 age group), to yield information about differentials in 'being healthy'; b) The reversal of weights currently attached to the adult literacy and average enrolment components of the education indicator, such that the former has a lesser weight than the latter; c) Use of the income indicator to provide inherent information over and above that provided by the functionings, by standardising for skills; d) Supplementation of or replacement of the income indicator by a 'drudgery' indicator i.e the number of hours of work (paid or unpaid) by men and women.

Income (as also poverty) is normally a variable which is measured on households rather than individuals. Where it is measured on individuals, intervening variables which cannot be read off from income, affect its translation to control over resources, decisions and to well-being. Where evidence exists, it seems that gender differentials in indicators of functionings do not necessarily conflate with differences in opulence indicators. Except for the gender gap in education, it is not evident that gender inequality is universally higher amongst lower income groups. We have reviewed opulence indicators largely in the form of income poverty but it is very likely that property ownership would reveal the same lack of relation.

5.1 Implications for policy and for research

This paper has been confined to an evaluation of the reliability of indicators of gender differentials in well-being. Evaluations of the policy process were outside its scope. Recommendations for research and policy would need to take the latter into account. Two points alone can be contributed at this stage.

First, the marginal cost of adding questions to national decennial censuses and to intermediate, census style surveys is assumed to be low (in passing we note here that even after 40/50 years of UN data gathering, there appears to be no easily accessible manual evaluating the comparative skills required and costs involved in collecting social data). If cost is indded low, then there is a strong case to invest in the improvement of existing composite indicators (and the simple indicators they are based on) in order to make them both systematic and appropriate to developing countries (rather than investing in the development of new composite indicators). Census authorities need to make gender differentiated juvenile mortality data available in as disaggregated a form as possible (by region, income/property, by caste/ethnic and religious groups) especially for the age groups 0-2 and 3-9. While data for educational 'flow' variables appear satisfactory, systematic data on gender segregation in educational fields is desirable. Further, rather than make assumptions about gender differentials, gender disaggregated data needs to be analysed at different levels like class, region caste and others as appropriate.

Second, indicators of well-being, while useful in broad-brush terms for comparative purposes, reveal nothing about the social processes giving rise to the results. The evidence reviewed for this paper shows that little can be assumed about such relations of disadvantage. They require empirical specification which in turn requires micro-level research. Generalisation from such research in turn requires assumptions about typicality. To date such research has been characterised by a high degree of individuality and idiosyncrasy (see Harriss, 1990 and 1993 for a discussion of this problem). While such research is useful *per se* for its contribution to understanding, it will always be possible for a policy maker to dismiss evidence about process and/or relations. It is therefore the more important that research is fed into other components of the policy process (for example the media, activist lobbies, political parties). At the same time, international legitimisation for both the authority of general indicators and the specific insights from analyses of process would advance the use of indicators out of the arenas of ranking and comparison and into that of policy.

6. Acknowledgements

Thanks are due to Ashwin Srinivasan for his generous help with an understanding of the mathematical framework of the functionings approach.

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