MEASUREMENT OF ECONOMIC CONTRIBUTION IN A RURAL DEVELOPING COUNTRY

(Based on preliminary results using old data set. A new and clean data is available now and will be used for final paper)

1. Problems of measuring income in developing countries

In rural areas of all developing countries, a significant number of individuals work in family-owned farm and non-farm enterprises. Some earn income by combining work in family and non-family enterprises. They often have problems figuring out their personal income, because those who work in a family enterprise usually do not get any fixed remuneration for their efforts, unlike others who operate in the market. This is even more problematic in the case of subsistence production, where most of the women in rural areas work. People usually do not include the "value" they produce in family-based subsistence production as their income. In such situations, they frequently report zero income.

Whereas some household surveys have tried to collect detailed information on household income and individual income, it remains problematic how to distribute the income from a family enterprise to the family members who worked in that enterprise. Estimates of individual income or wages thus require some method of decomposing income reported as the household income into the returns attributable to individual members. Economists have tried to develop estimates of the value of the time spent in family-based/owned enterprises using two different methods: a market-cost approach, and an opportunity-cost approach. The opportunity cost approach sets the value of work done in family-based/owned enterprises equal to the income a person doing these works could have earned in the labor market. The market cost

approach uses the cost of hiring someone to do the family-based/owned works to determine its value. These approaches have some general difficulties and can lead to quite unreasonable results (Ferber, 1982). Moreover, in the case of intra-household resource allocation these approaches make little sense. In this case, what is more relevant is how the head of the family or other adult members of the family *perceive* the contribution of a household member. They certainly do not consider the complicated factors the above two approaches take into account in assessing the contribution of a person. Attempts are also made to all household income to the head of the household (Deaton, 1997; Thomas, 1997).

In this paper, I develop a new and better method to decompose household income into individual income using data from Matlab Health and Socioeconomic Survey (MHSS) conducted in 1996-96 in a rural area of Bangladesh. The data set used in this study consists of 11151 person, aged 15 and above, from 4536 households. About 50% of the respondents are female.

2. Information on productive activity and income in the MHSS

The MHSS, like other RAND family life surveys and World Bank LSM surveys, collected information on the market value of the output produced in family enterprises from the head of the household, the efforts a member put into these production processes, the occupation of each member of the household (both sampled members and non-sampled members), and the types of assets each member owns. In the MHSS, information on incomes earned by the household from family-owned enterprises and family-based income generating activities in the last one year

preceding the interview was collected from the head of the household. These incomes include income from:

- cultivation (own land + rented land)
- selling and renting agricultural land, real estate, boat, rickshaw, weaving machine, livestock
- selling eggs, milk, fish, fishing nets, fruit, farm equipment, ponds, trees, jewelry
- family-owned business.

Information on non-familial employment and income was collected from all selected individuals aged 15+. (The head of the household, all household members aged 50+, and the spouse of any previously selected respondent were included in the sample. In addition, if there were other household members aged 15-49, two were chosen at random.) Each person was asked whether he or she participated in any productive activities in the one-year reference period, regardless of days and hours worked. The MHSS defines as productive activity all income-generating activities, production of market oriented goods and services, and production of goods for subsistence. If a person worked in those activities even for an hour during the reference period, he or she is regarded as economically active. All selected individuals were asked how much he or she earned from these productive activities, how much they received from the selling/investing personal assets and whether he/she received *transfer income* from persons outside the household. However, household work like cooking, cleaning, childcare, etc. was not considered as economic activity.

The MHSS also collected information on occupation (but not on income) of all household members aged 15+ who were not selected for detailed interview. This information was collected from the head of the household and is crucial in developing the allocation rule used in this paper. For the selected persons in the household, the MHSS collected information on up to 4 occupations per person; the average number of occupations reported was 1.46. In total, 8485 persons out of the 11151 respondents aged 15+ are reported to have engaged in some productive activities during the reference period. These 8485 persons reported 12403 occupations. For 5696 of these 12403 occupations, income was reported as zero, of which 5209 cases belong to the occupations listed in Table 1. Possible explanations why income was not reported in these cases are:

- the activities were undertaken as unpaid family work and/or
- the activities did not result in the eventual sale of the product produced.

Table 1. Reported occupation and missing income

Occupation	Total number who reported the occupation			Total number who reported the occupation but reported income as 0 or "don't know"		
	Male	Female	Total	Male	Female	Total
Post-harvest work	3	2449	2452	1	2328	2329
Cultivate own land	1761	47	1808	1633	44	1677
Poultry-rearing	7	2288	2295	2	755	757
Cow/goat rearing	75	434	509	41	249	290
Sharecropper	339	10	349	151	5	156

In these cases, people do not know what their earnings were. For the occupations which are predominately female (such as husking, poultry rearing), a

third possible reason may be that, although they participated in the activities, they did not have any control over the sale of the product they produced, so they did not report any income. Any use of personal income information without correcting these shortcomings will be incomplete and misleading.

The MHSS collected information on the value of all assets owned by the household from the head of the household and on household income from those assets. Individuals were asked if they owned each of a set of assets, but not the value of those assets. They did report personal income from sale/investment of those assets. I therefore developed a set of rules to divide income from particular assets among those who claimed ownership of that type of asset but did not report personal income from the asset

3. Construction of *attributed income*

As I discussed earlier, the market-cost and opportunity cost approaches are not effective methods for imputing income. In this paper I develop rules for attributing two types of income – labor and asset – to an individual.

First, using household income from family-based production of goods, I develop rules to attribute appropriate labor income to the individuals who reported zero income but participated in family-based production.

Second, individuals also receive a sizeable amount of non-labor income from selling or investing assets. This income should not be neglected in reconstructing individual income data. Although the MHSS collected information on asset income by type of asset at the household level but not at the individual level, it contains

information on types of assets a person owns. In this section I discuss the rules to allocate household asset income to the individual based on this information.

3.1. Attributed income from labor:

As mentioned before, there were 5696 cases of occupations (involving 3018 people) for which income was reported as zero. Given the information available, it is possible to attribute income only for those 5209 cases (91% of 5696 cases) in which people reported their occupation as one of those listed in Table 2. The following household income/production information was collected:

- Market value of agricultural production as assessed by the head of the household
- Income from selling/renting livestock
- Income from selling egg & milk
- Income from agricultural equipment

and is used to attribute income to those in the following occupations listed in Table 2:

(a) cultivating own land

(b) share-cropping

(c) post-harvest work

(d) rearing poultry

(e) rearing cattle.

3.1a. Cultivating own land

1808 people report "cultivation of own land" as their occupation, of which 1677 (93%) reported zero income. What is the explanation for those who did report

some incomes? There is no clear answer for this question. The MHSS collected data on the market value of agricultural products produced during the reference period and the cost of production from the head of the household. But the survey did not collect any information about whether the household sold any of its output in the market. It is assumed here that income reported by the cultivator represent the value of the portion of agricultural production that was sold in the market. It is noted that not all household members who claimed this occupation also claimed income from their work. It is assumed that only those who had control over this income claimed it as their income.

In this paper, I use reported total market value, rather than net value, to calculate attributed income. The reason is that people in the study area do not seem to be very aware of the actual cost of production. For example, in many cases, seeds from previous years' output are used for cultivation, or the family already owns irrigation equipment. More importantly, it seems more reasonable for the family to perceive the contribution of a family member to the household economy in terms of total production, not in terms of complicated net production, because total production truly represents a member's efforts for the household economy.

For agricultural production using own land, family members who are involved in the production process are those who reported their occupations as cultivators, landowners, and post-harvest workers (post-harvest work involves husking, parboiling, drying and storage of crops). Some households may have all three occupational groups in the household and some may have only one or two. Some persons report only one occupation and some report multiple occupations.

The allocation rules developed here thus depend on:

- the market value of output produced as assessed by the head of the household;
- occupational composition of the household and the numbers of householder in an occupation, and
- the number of occupations a person hold at the same time.

The allocation rules are based on actual practices in many parts of Bangladesh, where there is a general principle for dividing agricultural output. It is divided into approximately equal amounts given to cultivators, landowners and capital providers. Assuming that cultivators also provide capital, the allocation rule attributes 66% of the assessed value to the cultivator. Based on this principle, the rules I devised for allocating household income to the relevant householders are set as follows (see Table 2a):

(a) *If a household has all three types of relevant occupations (Case-1: Table 2a), then cultivators are attributed 65%; landowners are attributed 30% and the post-harvest workers are attributed 5% of the total assessed value of the agricultural output.*

(b) *If a household has only cultivators and post-harvest workers (Case-3: Table 2a), then the allocation rule would be: cultivators - 95% and post-harvest workers - 5%.*

(c) *If a household has more than one member in any of the relevant occupation, then the income share of the relevant occupation is divided among the members having that occupation. For example, if a household has two cultivators and the household earns Tk.10,000 from*

*cultivation, then each cultivator has (.65/2)*10000=5250 attributed income.*

(d) *If a household has more than one member in any of the relevant occupation, then the income share of the relevant occupation is divided among the members having that occupation. For example, if a household has two cultivators and the household earns Tk.10,000 from cultivation, then each cultivator has (.65/2)*10000=5250 attributed income.*

(e) *If a person involved in agricultural production has another full time non-familial occupation, the household may not give him the same credit for the production as the other members who have only one occupation. In this case, his share is discounted by 20% and that 20% is then reallocated to other members in same occupation in the household.*

3.1b. *Share cropper*

In the case of sharecropping, a portion of the output goes to the non-householder landowner. The value of the output assessed here is after the portion going to the landowner is paid. Therefore, for allocation purposes the relevant occupations are sharecropper and post-harvest worker. The allocation rule for sharecropping is shown in Table 2b. Except for the difference in the share, the rules for sharecroppers are the same as for the cultivators who own their land.

Table 2a: Household income allocation rule for agricultural production on own land

Household composition	Allocation of household income from agricultural production in own land		
	Cultivator	Post-harvest worker	Landowner
Case-1: Cultivator+post-harvest worker +landowner	65%	5%	30%
Case-2: Cultivator+~~post-harvest worker~~ +landowner	67%	0%	33%
Case-3: Cultivator+post-harvest worker +~~landowner~~	95%	5%	0%
Case-4: Cultivator+~~post-harvest worker~~ +~~landowner~~	100%	0%	0%
Case-5: ~~Cultivator~~+post-harvest worker +landowner	0%	5%	95%
Case-6: ~~Cultivator~~+~~post-harvest worker~~ +landowner	0%	0%	100%

3.1c. *Income from selling livestock, egg, milk and agricultural equipment*

The rules for allocating household income from selling livestock, eggs, milk and agricultural equipment are shown in Table 2c. They are based on allocating the income from these endeavors to those who report them as their occupation. For example, if the household reports income from selling cows/goats and milk, that income is allocated to those household members who reported their occupation as "raising cow/goat". If there is more than one householder in a relevant occupation, the household income is divided equally among them.

In many cases, it is found that although some household income from activities considered for attributing income is reported, no one in the household qualifies to be attributed that income based on reported occupation or assets owned. One possible reason for this may be that the generators of this income do not live in the household. In these cases income is allocated either to the head of the household

Table 2b. Household income allocation rule for sharecroppers

Household composition	Allocation rule household income from sharecropping	
	Cultivator	**Post-harvest worker**
Case-1: sharecropper + post-harvest worker	67%	33%
Case-2: sharecropper + ~~post-harvest worker~~	100%	0%
Case-3: ~~sharecropper~~ + post-harvest worker	0%	100%

Table 2c: Allocation of income from livestock, egg, milk and agricultural equipment

Source of household income	Occupation that got the share
Selling cow/goat/milk	Raising cow/goat
Selling poultry/egg	Raising poultry
Selling agricultural equipment	Cultivation in own land Share-cropping

or spouse of the head depending on type of occupation and assets. Income from selling/renting fruit, fish, homestead, boat, rickshaw, pond, agricultural land, shop is attributed to the head of the household. Income from selling eggs, poultry, milk and jewelry is attributed to the spouse of the head if the spouse is female.

3.2. Attributed income from assets

Income from the assets listed in Table 3 is allocated based on the ownership of the individual asset. If there is more than one person reporting ownership of the same

type of asset, household income from that asset is allocated equally among the relevant members.

Table 3. Allocation of income from household asset income

Income from	Allocated to person(s) reported to have owned:
Selling homestead land/fruit/trees	Homestead land
Selling/renting agricultural land	Agricultural land
Selling pond/selling fish from pond	Pond
Selling jewelry	Jewelry
Savings in bank account	Bank account

4. Effects on measures of income

These rules were applied to the respondents in the MHSS. Thus, for each person, I generated a value for each of the following types of income:

Reported personal income - from self reports

Attributed labor income - from allocation of household occupation-specific income to people who reported that occupation, but zero income (or "don't know") from it

Attributed asset income - from allocation of household asset Income

Transfer income - from self-reported transfer income

Total economic contribution - the sum of the four types of income

Table 4 shows the mean value of income and the contribution of the various components for men and women. The difference between men and women is striking. Women have only 32% the total personal income of men and 19% the personal assets of men. The income differential would be even greater without transfer income and the attributed income from labor and household assets. Nearly half of the mean income of women comes from external transfers to them, most likely from migrant husbands, fathers, brothers, or sons. For men, only 20% comes from transfers. The attributed income categories constitute fully 35% of female income and 25% of male income.

Figures 1 and 2 shows the contribution of each type of income by age. At nearly all ages, transfer income is the major contributor for women, and the proportion increases with age. Attributed labor income is particular important for women under 60, while attributed asset income becomes increasingly important as women age.

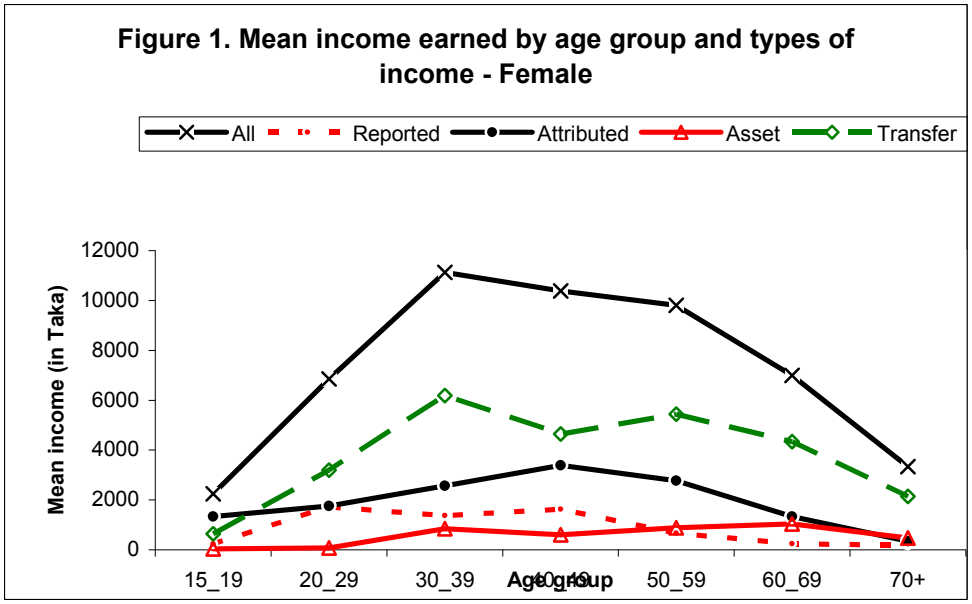
For men, the notable pattern is the very early decline in reported income with age. The peak is at ages 30-39, with fairly rapid decline thereafter. The moderate decline in total income after that age is due to the increase in transfer income and the far more modest increases in the attributed labor and asset incomes.

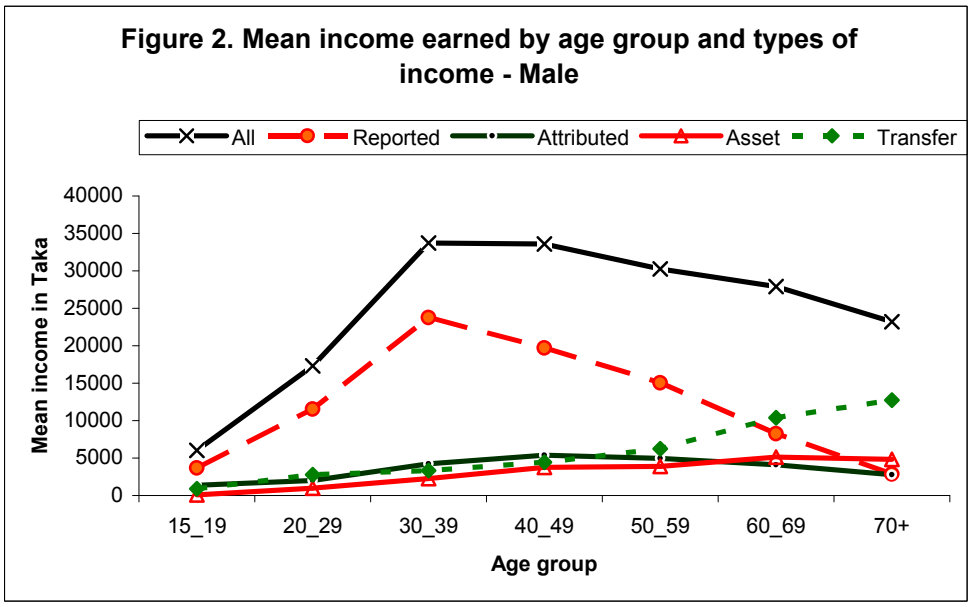
5. Conclusions

This paper clearly shows that reported income does not represent the actual income for many household members. It also shows that is possible to set out rules of attributing household income to the members if some key information is collected in

Table 4. Personal income and assets

	Males (n=5083)		**Females (n=6065)**	
	Mean	Percent	Mean	Percent
Personal income (Taka)				
Reported	14,582	55	1,312	15
Attributed labor	3,692	14	2,426	28
Attributed asset	2,917	11	588	7
Transfer income	5,317	20	4,212	49
Total income	26,508	100	8,538	100
Mean value of personal assets (in Taka)	39,123		7,426	





the survey. These rules make more sense than attributing all household income to the head of the household or attributing household income based on standard rule like opportunity cost approach and market-cost approach. However, the allocation rules developed in the chapter are based on the local socio-cultural-economic settings, which can be easily modified conforming to the socio-cultural-economic settings of the study area concerned. I used this new income measure in my paper "DOES HOUSEHOLD DISCRIMINATE AGAINST THE ELDERLY IN ALLOCATING HOUSEHOLD RESOURCES FOR HEALTH CARE: A RURAL BANGLADESH CASE STUDY" submitted in session 902. There I found my new income measurement explain intra-household resource allocation better than just "reported income"

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