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A SURVÉY IN WEIGHTS AND LAND MEASUREMENT UNITS USED IN BANGLADESH

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I. INTRODUCTION

It is generally contended that there are no standard weights and measures in transacting agricultural commodities in Bangladesh and that the prevalence of non-standardized weights and measures cause imperfection in the market. Farmer sellers are often exploited by the middleman through these weights and through "...the use of defective weighing tools and the operation of measuring quantity by volume" (Farruk 1970, p.44).

Like weights, there is the existence of a large variety of non-standardized local land measurement units commonly used in Bangladesh. It is stated that "all of these units may be converted into standard acres and decimals (haundredth of acres), but conversion factors often change from one locality to the next. Sometimes more than one unit of land measurement is used in the same locality" (Jannuzi and Peach 1977, p. xiii). However, there seems to be virtually no awareness about the possible consequences of the existence of these traditional units on the compilation of national statistics. In a recent article Pray (1980) has found method of data collection as the main source of bias in such statistics. It is possible that non-use or improper use of local land measurement and weighing units could be another important source of bias in national statistics.

A survey was conducted to document the various weight and land measurement units currently used in different parts of the country. In section II the methods of the survey are described. Findings are presented in section III. Conclusions are drawn at the end.

II. METHODS OF THE SURVEY

It was decided by the authors that a sample survey would be conducted throughout Bangladesh to collect information on units used for measuring land and output. No

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fund was available for conducting the survey. It was therefore decided that the third and fourth year undergraduate students of the Faculty of Agricultural Economics and Rural Sociology would be asked to collect information from their respective villages/localities as one of their required practical class/field exercises. Thus, 116 students collected information from 116 villages/localities covering 79 (16.7%) of the 473 thanas and 15 (80%) of the 20 districts in the country. The districts of Sylhet, Chittagong, Chittagong Hill Tracts, Faridpur and Khulna were not represented in the sample. Information was collected by the students in October 1980 when they went home on Eid-ul-Azha vacation.

III. FINDINGS OF THE STUDY

Land Measurement Units

Information about the names and magnitudes (in decimals) of different commonly used land measurement units were recorded from each sample village or locality. In all 21 units were reported to be in use in the sample villages. The frequency of use of each of the recorded units is shown in Table 1. It appears that Acre, Bigha, Katha, Kani, Gonda, Kora, Pakhi and Pura are the commonly used land measurement units. The most revealing aspect of the findings is that all the commonly used units except Acre have 2 to 11 magnitudes. For example, Katha is used in 62 villages in 11 different magnitudes in terms of decimals.

The frequency distributions of magnitudes in each unit are shown in Table 2. It appears that the magnitude of a Katha varies from 1.5 to 10 decimals, the most common magnitude being 1.65 decimals. The magnitude of a Bigha varies from 29 to 63 decimals, the most common being 33.33 decimals which is the official standard Bigha. The magnitude of a Kani varies from 3 to 266 decimals, that of a Gonda from 0.25 to 13.3 decimals, and of a Kora from 0.37 to 3.3 decimals. Jannuzi and Peach (1977) observed in the Land Occupancy Survey that a Kani varies between 40 and 160 decimals and a Gonda between 8 and 20 decimals in different districts of Bangladesh.

The individual units are not only multi-magnitudinal but also have different lines of hierarchy as shown in Table 3. For example, Katha is linked with Bigha—Acre hierarchy in 45 villages, with Pakhi—Khada hierarchy in 7 villages, and with Pakhi—Pura hierarchy in 10 villages. Kora is linked only with Gonda—Kani hierarchy in 22 villages.

In the Katha-Bigha-Acre hierarchy there are 11 lines each having different conversion factors between Katha and Acre. The Katha-Pakhi-Khada hierarchy has 5 conver-

sion lines and in all 5 cases the conversion factor between Pakhi and Khada is constant at 16. The Kora-Gonda-Kani has 8 conversion lines, and in all cases the conversion factor between Kora and Gonda is 4, and between Gonda and Kani is 20.

Land Measurement Apparatus

Historical record shows that Nol (Bamboo pole) of varying length has been in use by farmers for measuring land in Bengal for more than thousand years (Ray 1979, p. 15). Even though land actually belonged to the king during that period individual producers would lease in limited amount of land which they used to measure either for demarcation from others or for allocating to different crops. The length of a Nol is measured in terms of hand, a standard hand is taken to be equal to 18 inches. In addition to Nol, rope and tape are also used by farmers.

Information was collected in this survey about the names and dimensions of apparatus currently used for measuring land by farmers. In 39 (24%) villages Nol, in 25 (22%) villages Nol as well as chain, tape, rope, etc., and in the rest 50 (44%) villages only chain, tape, rope, etc. were used by farmers. Chain is the official standard apparatus for measuring land and it is used by land surveyors called Amins for settlement of disputes between land owners and for official demarcation of plots for recording land rights.

From each village using Nol actual length of three Nols used by three farmers were to be recorded. However, this information came from 40 out of 64 villages using Nol. Analysis of the information revealed two things : (i) The length of a Nol varied from 4 to 15 hands (72 to 270 inches) between villages. (ii) In most villages the actual length of the three sample Nols measured in inches varied. For example, 36 Nols of 12 villages were reported to be 4 hand (72 inches) long, but 8 of them were found to be less than 72 inches and 15 more than 72 inches (Table 4).

The inter and intra village variations in the actual length of Nols could be explained in the following manner : (i) The normal length of a Nol in a village appeared to be related to the commonly used unit for measuring land. For example, in the villages where the magnitude of a Katha is 1.65 decimals, the length of a Nol is usually 4 or 8 hands (72 or 144 inches). It is observed that 1 Nol in width and 20 Nols in length in the case of 4-hand Nol or 1 Nol in width and 5 Nols in length in the case of a 8-hand Nol makes 1 Katha of 1.65 decimals. (ii) While preparing a Nol farmers do not generally use tape or scale to determine its length. Rather they use hand, assuming 18 inches for each hand. Actually not all men are equal in height nor are the length of their hands. Those who think that the length of their hands are shorter than 18 inches make adjustments

arbitrarily by adding one or two finger breadth as the case may be. As a result, the actual length of a Nol measured in inches may be larger or smaller than what it should be. Consequently, this imperfection in the apparatus may give rise to disputes about land boundaries between owners, which ultimately may lead to lawsuits or even murder (Jabbar 1978 ; Adnan 1976).

Weights and Weighing Apparatus

The investigators were asked to record the kind of apparatus that farmers normally use for weighing their farm produce. Findings suggest that farmers generally use balance for weighing output for sale in the market, but for own estimation of the volume of farm output they use various kinds of baskets and pots made of bamboo, cane or clay (Table 5). It also appears that the same kind of apparatus is used in different places but their volumes differ substantially.

Tola-Satak-Sher-Mon is the hierarchy of weighing units commonly used in Bangladesh. Five tolas make a satak, 16 sataks make a sher, and 40 shers make a mon. The most frequently used unit is the sher which should contain 80 tolas. This survey suggests that farmers in 48 percent of the sample villages use 80 tola to a sher for both sale and purchase of goods. In the remaining 52 percent villages, number of tolas in a sher appeared to vary between sale and purchase of goods by farmers, between crops and between places (Table 6). Farruk (1970) states that buyers and sellers are aware of the conversion rates between standard and non-standard weights and price-quantity adjustments are accordingly made. The validity of this statement is questionable. Ahmed *et al.* (1980) provide evidence which contradicts the above statement. They found that government appointed rice dealers purchased paddy/rice from farmers weighing more than 80 tolas for a sher but sold it to the government procurement centres weighing 80 tola for a sher. Moreover, farmers were very often paid less than the officially fixed procurement price. Thus the traders made extra margin from either or both of weight and price differentials.

IV. CONCLUSIONS

The most important evidence emerging out of this survey are : (i) a number of different units are used for measuring land throughout the country ; (ii) magnitude of each unit varies substantially between places ; (iii) hierarchy of different land measurement units also varies across the country ; (iv) farmers do not usually use balance for own estimation of the volume of farm produce, rather they use different kinds and sizes of baskets and pots. These locally used land measurement and weighing units are not properly taken into consideration in the process of compilation of national acreage and

output statistics. The evidence of this survey implies that non-use or improper use of local measuring and weighing units in recording basic farm level data might be an important source of bias in national agricultural statistics.

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TABLE 1 NUMBER AND PROPORTION OF SAMPLE VILLAGES USING DIFFERENT LAND MEASUREMENT UNITS

Sl. No.	Name of unit	No. of villages using	% of sample villages (n=116)	No. of magnitudes in the unit	Range of magnitudes in decimals
1	Acre	68	58.6	1	—
2	Katha	62	53.5	11	1.5—10.0
3	Bigha	53	45.7	8	29—63
4	Kani	32	27.6	9	3—266
5	Gonda	24	20.7	7	0.25—13.3
6	Pakhi	21	18.1	7	26—90
7	Kora	20	17.2	7	0.37—3.3
8	Pura	15	12.9	4	104—3200
9	Khada	9	7.7	4	416—896
10	Doon	6	5.2	4	25—640
11	Kuni	5	4.3	1	—
12	Kura	4	3.4	4	20—100
13	Ara	4	3.4	3	128—160
14	Kranti	3	2.6	1	—
15	Poa	2	1.7	2	7.5—22.5
16	Dhul	2	1.7	1	—
17	Dur	2	1.7	2	—
18	Satak	2	1.7	1	—
19	Beesh	1	0.8	1	—
20	Kusi	1	0.8	1	—
21	Pai	1	0.8	1	—

Source : Field survey

TABLE 2 MAGNITUDES OF DIFFERENT LAND MEASUREMENT UNITS AND SAMPLE VILLAGES USING THE MAGNITUDES IN DIFFERENT UNITS

Magnitude in decimals	Number of villages	Percen- tage	Mangitude in decimals	Number of villages	Perncen- tage
Katha			Kani		
1.5	7	11.3	3	2	6.3
1.65	25	40.4	8.75	1	3.1
2.1	3	4.9	14	2	6.3
2.5	2	3.2	30	8	25.0
3.0	2	3.2	35	3	9.4
5.0	3	4.9	40	6	18.7
6.5	10	16.1	120	3	9.4
6.7	2	3.2	160	6	18.7
8.0	1	1.6	266	1	3.1
8.75	2	3.2			
10.0	5	8.0			
All	62	100.0	All	32	100.0
Kura			Doon/Dorun		
20	1	25.0	25	1	16.7
63	1	25.0	30	1	16.6
66	1	25.0	480	3	50.0
100	1	25.0	640	1	16.7
All	4	100.0	All	6	100.0
Pura			Khada		
104	12	79.9	416	1	11.2
108	1	6.7	528	2	22.2
2560	1	6.7	832	3	33.3
3200	1	6.7	896	3	33.3
All	15	100.0	All	9	100.0

(Conted)

Table 2 (Contd.)

Magnitude in decimals	Number of villages	Percen- tage	:	Magnitude in decimals	Number of villages	Percen- tage
Bigha				Pakhi		
29	1	1.9		26	3	14.3
33.33	44	83.0		33	3	14.3
34	1	1.9		35	1	4.7
40	1	1.9		52	5	23.8
42	1	1.9		56	5	23.8
52	3	5.6		72	1	4.8
60	1	1.9		90	3	14.3
63	1	1.9				
All	53	100.0		All	21	100.0
Gonda				Kora		
0.25	2	8.3		0.37	4	20.0
1.5	5	20.8		0.44	2	10.0
1.75	3	12.5		1.0	1	5.0
2.0	3	12.5		1.25	1	5.0
5.5	3	12.5		1.7	7	35.0
8.0	7	29.2		2.0	4	20.0
13.3	1	4.2		3.3	1	5.0
All	24	100.0		All	20	100.0
Ara				Poa		
128	1	25.0		7.5	1	50.0
140	1	25.0		22.5	1	50.0
160	2	50.0				
All	4	100.0		All	2	100.0
Unit	Decima's	Village		Unit	Decimals	Villages
Beesh	500	1		Satak	0.103	2
Kuni	7.5	5		Til	0.03	1
Kranti	0.66	3		Kusi	2.5	1
Dur	0.15	2		Pai	1.5	1
Dhul	0.0825	2		Sher	4.0	1

Source : Field survey.

TABLE 3 HIERARCHY OF LAND MEASUREMENT UNITS AND CONVERSION FACTORS BETWEEN UNITS IN A HIERARCHY

Magnitude of units in decimals				Conversion factors between units	
No. of Village	Katha	Bigha	Acre	Bigha/Katha	Acre/Bigha
24	1.65	33.33	100	20	3
7	—	33.33	100	—	3
5	1.5	33.33	100	22.2	3
2	2.5	52	100	20.8	1.9
1	3.0	60	100	20	1.7
1	5.0	63	100	12.6	1.6
1	2.1	42	100	20	2.4
1	1.5	30	100	20	3.3
1	2.0	33.33	100	16.5	3
1	2.0	40	100	20	2.5
1	5.0	—	100	—	20 (Acre/katha)
	Katha	Pakhi	Khada	Pakhi/Katha	Khada/Pakhi
1	1.5	33	528	22	16
1	6.5	26	416	4	16
2	—	56	896	—	16
2	—	52	832	—	16
1	—	33	528	—	16
	Katha	Pakhi	Pura	Pakhi/Katha	Pura/Pakhi
1	6.5	26	104	4	4
8	6.5	—	104	—	16 (Pura/katha)
1	6.75	—	108	—	16 do
	Kora	Gonda	Kani	Gonda/Kora	Kani/Gonda
7	0.37	1.5	30	4	20
6	2.00	8.0	160	4	20
2	1.5	6.0	120	4	20
1	3.3	13.3	266	4	20
1	2.0	—	40	—	20 (Kani/Kora)
1	0.44	1.75	35	4	20
1	—	1.75	8.75	—	5
1	0.25	—	30	—	120 (Kani/Kora)
1	0.5	2.0	40	4	20
1	1.25	5.0	100	4	20

Table 3 (Contd.)

Other hierarchies					
a)	14 decimal	=	1 kani, 4kani	=	1 bigha, 16 bigha = 1 khada
b)	18 „	=	1 satak, 4 satak	=	1 pakhi
c)	1.75 „	=	1 kora, 30 kora	=	1 pakhi, 2 pakhi = 1 pura
d)	8.75 „	=	1 katha, 4 katha	=	1 kani, 4 kani = 1 ara
e)	10 „	=	1 katha, 16 katha	=	1 ara,
					20 ara = 1 pura
					16 ara = 1 pura
f)	8 „	=	1 katha, 16 katha	=	1 ara
g)	5 „	=	1 katha, 20 katha	=	1 kura

Source : Field survey

TABLE 4 FREQUENCY AND AVERAGE LENGTH OF NOLS (POLES) ORDINARILY USED FOR LAND MEASUREMENT

Length in hand and inches	No. of ples	Average length in inches	Range in inches
4-Hand Nol			
Less than 72 inches	8	71.06	70 —71.5
72	13	72.0	—
More than 72	15	72.8	72.3—74
All sizes	36	72.13	70 —74
4.5-Hand Nol			
Less than 81 inches	1	80.0	—
81	2	81.0	—
More than 81	1	82.5	—
All sizes	4	81.13	80 —82.5
5-Hand Nol			
Less than 90	—	—	—
90	2	90.0	—
More than 90	5	93.16	91.8—94
All sizes	7	92.26	90 —94
7-Hand Nol			
Less than 126	1	124.5	—
126	14	126.0	—
More than 126	5	127.3	127 —128
All sizes	20	126.25	124.5—128
7.5-Hand Nol			
Less than 135	6	132.6	130 —134
135	8	135.0	—
More than 135	1	136.5	—
All sizes	15	134.13	130 —136.5
8-Hand Nol			
Less than 144	1	140.0	—
144	5	144.0	—
More than 144	3	149.3	148 —152
All sizes	9	145.3	140 —152
14-Hand Nol			
Less than 252	2	247	243 —251
252	8	252	—
More than 252	1	253	—
All sizes	11	251.18	243. —253
Others			
112—113 inches	3		
156—160	6		
176—182	3		
198—199	3		
270—277	2		

Source : Field survey

TABLE 5 NUMBER AND VOLUME OF DIFFERENT APPARATUS USED BY FARMERS FOR WEIGHING FARM PRODUCTS AT HOME

Volume in sher	Number of villages using different apparatus							All
	Dali/Dala Duli	Katha	Dhama	Arie	Arie	Poa	Others ^a	
1	2	—	—	—	—	—	—	2
1.3/1.5	—	2	—	—	—	—	2	4
2	1	—	—	—	—	—	—	1
2.5	5	—	—	—	—	—	1	6
3	3	1	—	—	—	—	1	5
3.3	—	1	—	—	—	—	—	1
3.75	1	—	—	—	—	—	—	1
4	2	1	—	—	—	—	—	3
4.5	1	—	—	—	—	—	—	1
5	6	13	2	1	—	—	6	28
6	—	4	—	—	—	—	—	4
7	—	2	—	—	—	—	2	4
7.5	—	5	1	—	1	—	—	7
8	1	—	1	—	1	—	1	4
10	4	3	5	2	4	—	7	25
12	—	1	—	1	—	—	—	2
15	2	—	2	—	—	—	1	5
16	—	—	1	1	—	—	—	2
17	—	—	—	—	—	—	1	1
18	—	—	—	1	—	—	—	1
20	—	—	1	—	—	—	—	2
22/26	—	—	—	—	—	—	2	2
All	28	33	13	6	6	—	25	111

a. Others include Choyen 5, Paila/Hari 3, Poika 2, Botua 2, Khuchi 2, Hanjo 1, Chuina 1, Pati 1, Dora 1, Khari 1, Pali, Pairi 1, Doon 1, Tepor 1, Khadi 1, Pura.

TABLE 6 NUMBER OF TOLAS IN A SHER FOR PURCHASE AND SALE OF GOODS BY FARMERS IN SELECTED THANAS

Name of District/ Thana	Tolas in a sher for		Remarks
	Sale	Purchase	
Dinajpur			
Nobabgonj	80/60	80/60	60 for oil seeds.
Rongpur			
Soyodpur	80/60	80/60	60 for rice and jute.
Gongachora	90/80/60	80	90 for rice ; 60 for paddy.
Mithapukur	90/80	90/80	90 for paddy in case sale & 90 for rice in case of purchase.
Ulipur	90/80	90/80	90 for paddy and rice in case of sale and 90 for rice in case of purchase.
Gaibandha	86/80	80	86 for pulses and Mustard.
Gobindogong	80/60	80/60	60 for Gur (mollasses).
Bogura			
Sariakandi	84	80	
Bogura	80/60	80/60	60 for Gur.
Pabna			
Kazipur	84/80	80	84 for jute.
Joshohore			
Norail (1)	84/80	80	84 for rabi rops.
Norail (2)	82/80	80	82 for pulses.
Lohagora	84	80	
Bakhorgonj			
Kathalia	70	80	
Mathbaria	80/70	80/70	70 for rice.
Meheadigonj	82.63/82	80	
Potuakhali			
Mrijagonj	105/100	80	
Amtoli	82	80	
Dhaka			
Joydebpur	85	80	
Tangail			
Tangail	82/80	80	
Bashail	82	80	
Kalihati (1)	82	82	
Kalihati (2)	84	80	
Kalihati (3)	82	80	
Modhupur	84/80	80	

Continued

Table 6 (Continued)

Name of District/ Thana	Tolas in a sher for		Remarks
	sale	Purchase	
Jamalpur			
Jamalpur (1)	105/80	80/60	105 for rice ; 60 for Gur.
Jamalpur (2)	85/84.5	80	
Jamalpur (3)	84/80	80/60	60 for Gur.
Jamalpur (4)	84/80	120/80/60	84 for paddy & mustard, 120 for mustard oil 60 for Gur.
Jamalpur (5)	84	80	
Jamalpur (6)	84/80	80	
Jamalpur (7)	85/80/60	80	85 for rice, 60 for Gur.
Melandah	85/80	80	85 for paddy & rice.
Islampur	84/80	80	
Dewangonj	85	85/80	85 for rice & flour.
Sribordi	85/80/60	85/80	85 for paddy, rice, jute, 60 for Gur.
Moymonshingha			
Kotwali (1)	86/80	86/80	86 for paddy, rice, jute, wheat.
Kotwali (2)	86/80	80	86 for paddy, pulses.
Kotwali (3)	86	80	
Muktagachha	84	80	
Fulbaria	84	84	
Goffargaon	84.63	80	
Hoshenpur	100/80	80	100 for milk.
Kishoregonj	84	80	
Dhobaura	100/80	80	100 for rice.
Kumilla			
Sharail	82	80	
Bansarampur	82/80		
Daudkandi	82/80	80	82 for jute.
Debidaar	82	80	
Burichong	82.63	80	
Kachua	82.63	80	
Matlab	87/86	86/80	80 when bought from grocer shop. 86 when bought from 'Faria'.
Koshba	84/82	80	84 for oil seeds.
Noakhali			
Begomgonj	82	80	
Sagolnaya	82	80	
Feni	90/80	80	90 for paddy, pulses, oil seeds.

Source : Field survey