

Time Allocation in Northern Ghana: An Example of the Random Visit Method

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When Cleave reviewed most of the studies available on labor use among African farmers, one of his most striking conclusions was the generally low amount of labor allocated to agriculture.¹ Lele has spoken of the paradox of low labor inputs in the face of an apparent labor surplus in rural Africa and has suggested three possible explanations: the seasonal nature of agricultural work, the importance of nonagricultural pursuits, and the role of women in African agriculture.² To understand the relative importance of these three factors to interpreting labor patterns in rural Africa, we need more data from a wider range of locations than currently available. We also need to ensure that data on household labor allocation include the entire range of productive activities. This paper describes time allocation in a farming settlement in northern Ghana, an area for which little information on household labor use has been available, and discusses methodological alternatives for collecting such data.

The Area

The data were collected as part of a study carried out in a Nankane-speaking settlement in Navrongo District, northern Ghana, between October 1975 and May 1977.³ As in much of the rest of northeastern Ghana, population density here is quite high, with large areas of continuous settlement often exceeding 150 persons per square kilometer. The settlement pattern is a dispersed one. A man may live with his wives and children only or share a compound with his father, brothers, or other close agnates. Coresident males may farm their land separately or in common. Those men and their families who farm together can be referred to as a farming unit. In a sample of 64 farming units in the settlement, there were an average of 1.6 men and 2.2

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women. Measurements were made of landholdings of 23 farming units; the mean amount of land per farming unit was 1.06 hectares, with a range of 0.25 to 3.18 hectares.⁴

The main crops of bulrush millet, guinea corn, and groundnuts are planted in two types of fields: the compound farm, which surrounds the house, and the bush farms, which may be located up to several kilometers from the house. In the sample of houses included in the study, cropped area was about evenly divided between bush and compound farms. Planting of the compound farms usually begins in late April or May. Millet and guinea corn may be sown simply with a planting stick, but 51 percent of the compound farms and 86 percent of the bush farms were planted on land prepared with a bullock plow. Bush farms are planted after the compound farms; and weeding, which is all done by hand, is begun as soon as a few weeks after planting. Early millet can be harvested in August; late millet, guinea corn, and groundnuts in October and November.

Although small quantities of crops may be sold, in general agricultural production is exclusively for home consumption, and the settlement in recent years has been a net importer of food. Farm animals, on the other hand, are an important source of income. Chickens, guinea fowl, eggs, goats, and sheep can all be sold at the local market to traders who export them to the population centers of southern Ghana. Other opportunities also supplement the agricultural economy. Men earn cash in petty trading or craft work and engage in seasonal and long-term labor migration, leaving to find work in southern Ghana. Women may engage in local trade, buying and selling agricultural produce, cooking food or brewing beer to sell in the market, or making pottery.

Method

The method used to collect the data for this study is quite different from techniques usually employed for this purpose. The collection of household labor allocation data in rural Africa generally requires rather elaborate methods, because low levels of literacy preclude farm record-keeping techniques. One of the most commonly used methods involves an interviewer visiting a sample of farmers at frequent intervals, typically one to three times a week, and recording all activities since the previous visit.⁵ Occasionally researchers require even more detail, especially about certain activities or segments of the population, and extended periods of direct observation may be carried out.⁶

These intensive time allocation studies are quite expensive, requiring a team of trained interviewers to work essentially full time throughout the study period. The method employed in this study takes a somewhat different approach. This technique, one of random visits, was developed and first used by Allen Johnson to study the Machiguenga of lowland Peru.⁷ The researcher selects a sample of households for observation throughout the year and prepares a random schedule of days and hours for visits. When visiting a house, the interviewer records the activities of all members of the household at the moment of the visit. Over the course of the year, a large series of random observations of community members' activities is compiled, and estimates of the proportion of time spent in various activities can be made.

In this study, a group of 12 neighboring compounds was selected, based on the judgment that their compositions and activities were representative of those of the settlement. To set a schedule of visits, five or six days were randomly chosen for each month. The year's schedule included 70 days, between March 1976 and March 1977. For each day, an hour between 6 A.M. and 6 P.M. was randomly assigned for making a visit.⁸ Thus, on 70 occasions the observer set out at the appointed time to visit the 12 compounds and record the activities of their members *at the instant of his arrival*. Because they were contiguous, the compounds could all be visited within the space of an hour.

Although the sample population consisted of 20 adult males, 29 adult females, 11 youths (aged 11 to 15), 15 children (aged 5 to 10), and 12 infants under the age of 5, only data on adults' activities are reported here. The 70 visits to the 20 men in the sample yielded 1,400 observations, but of these, a total of 285 were instances when the men were resident outside of the settlement (for the most part when they were away working in the south). Therefore, the number of observations of men resident in the settlement is reduced to 1,115. Similarly, of a total of 2,030 possible observations of the women in the sample, only 1,812 were made while these women were residents (in this instance, the majority of absences are due to women marrying outside of the sample). Observations of each activity are then expressed as a percentage of total observations. Multiplying this percentage by 13, the number of hours of observation (from 6 A.M. to 7 P.M.) gives the number of hours per day for each activity. Table 1, which presents this information, gives an estimate of how residents in the settlement spend their time.

TABLE 1
HOURS PER DAY SPENT BY ADULTS IN VARIOUS ACTIVITIES

ACTIVITY	FEMALES			MALES		
	Full Year	Dry ^a Season	Wet ^b Season	Full Year	Dry ^a Season	Wet ^b Season
Farm, compound	0.81	0.10	1.39	1.74	0.10	2.89
Farm, bush	0.85	0.03	1.53	1.14	0.14	1.83
Farm, other	0.44	0.03	0.79	0.20	0.00	0.34
Animals	0.10	0.07	0.14	1.24	1.40	1.12
Craft	0.62	1.05	0.30	0.72	1.21	0.38
Trade	1.04	1.39	0.74	0.73	0.71	0.73
Food preparation	2.15	2.50	1.85	0.09	0.12	0.08
Housekeeping	0.34	0.22	0.46	0.17	0.12	0.22
House building	0.30	0.36	0.23	0.59	1.09	0.23
Drawing water	0.64	0.96	0.36	0.10	0.26	0.00
Child care	0.52	0.55	0.51	0.05	0.00	0.09
Eating	0.21	0.29	0.14	0.35	0.39	0.31
Ritual	0.09	0.09	0.08	0.29	0.38	0.23
Leisure	2.74	3.28	2.30	3.30	4.36	2.57
Visit markets	0.60	0.48	0.69	0.75	1.00	0.59
Visit outside settlement	1.17	0.98	1.34	0.53	0.57	0.51
Illness	0.12	0.18	0.07	0.59	0.66	0.53
Not known	0.26	0.44	0.10	0.42	0.48	0.38
Total	13.00	13.00	13.02	13.00	12.99	13.03

^aDry season: 25 March 1976—3 May 1976 and 17 November 1976—7 March 1977.

^bWet season: 4 May 1976—16 November 1976.

Farming

For convenience, table 2 summarizes time spent in major activities. It shows males devoting an average of 5.1 hours per day to farm work during the wet season, and females 3.7 hours. Table 1 divides this activity into three

TABLE 2
SUMMARY OF ADULT TIME ALLOCATION
(Hours per Day)

ACTIVITY	FEMALES			MALES		
	Full Year	Dry Season	Wet Season	Full Year	Dry Season	Wet Season
Farming ^a	2.1	0.2	3.7	3.1	0.2	5.1
Animals	0.1	0.1	0.1	1.2	1.4	1.1
Craft	0.6	1.1	0.3	0.7	1.2	0.4
Trade	1.0	1.4	0.7	0.7	0.7	0.7
Household ^b	4.0	4.6	3.4	1.0	1.6	0.6
Total	7.8	7.4	8.2	6.7	5.1	7.9

^aSum of all farming, including time to walk to and from fields.

^bSum of food preparation, housekeeping, house building, drawing water, and child care.

categories. The first, compound, refers to time spent planting, weeding, and harvesting the major crops in the compound farm around the house. The second, bush, summarizes time spent at the fields distant from the house, including time spent walking to and from the fields (the walking itself constitutes about 0.3 hours per day for men, 0.2 hours for women). The third category, other, is for the time women spent attending to minor crops planted near the house, and for the time men spent in caring for crops such as Coleus potatoes; it also includes the time spent in communal or exchange farming, but in this sample the time spent in such activities was minimal. Hired labor, used only occasionally, did not figure in any of the households that were studied.

For men, the majority of time spent farming was on the compound farm. The figure includes all farming activities, but the vast majority is time devoted to weeding. Although areas of bush farms and compound farms are roughly equivalent for the sample, men spend less time on the bush farms because they have a greater tendency to be plowed and they are more often planted in groundnuts; both factors reduce weeding requirements. Because weeding is best done after a rain, many days may be spent doing relatively little farm work, followed by a rain and then several long days of weeding before the ground hardens again. The requirements of weeding probably pose the most severe limitations to increased agricultural production, even if more land were available, but there are also constraints of inadequate technology, the lack of manure to maintain soil fertility, and chronically low food supply at the time of peak labor requirements.⁹

Women's time is more evenly distributed between bush farms and compound farms. Women contribute heavily to planting and harvesting of both grains and groundnuts. They tend to have major responsibility for weeding groundnut fields, and approximately two-thirds of the women in the sample also help weed millet and guinea corn.

Nonfarm Labor

Besides providing information on the division of agricultural labor within the household, the data offer estimates of the amount of time spent in activities other than farming. In an environment such as northern Ghana, these activities often assume great importance.

The care of animals provides an example. Herding activities are generally in the hands of male youths and children, who spend more than 5 hours a day looking after cattle, goats, and sheep. Adult males also spend 1.2 hours a day looking after animals, more than two-thirds of which is devoted to looking after poultry. One of the most time-consuming tasks is collecting a type of termite that is fed to newly hatched chicks. Each farmer has one or more locations where he knows the insects to be living and keeps pots of cow dung over their nests; by attracting termites to feed on the cow dung, the farmer can collect a fresh pot of termites each day. Poultry and eggs provide a regular, if modest, source of income throughout the year.

Crafts and trading together occupy approximately 1.5 hours per day for sample members throughout the year, but interpretation of these figures must take into account the idiosyncracies of the sample, for not all adults practice a craft or engage in trading. Table 3 presents the breakdown of sample member activities. Thus, time spent in craft or trade is contributed

TABLE 3
NONAGRICULTURAL ACTIVITIES OF SAMPLE MEMBERS

Activity	Females ^a	Activity	Males ^b
Pottery	7	Leathermaker	3
Market trade	5	Animal trader	3
Trade + pottery	2	Petty trader	2
Beer brewing	1		

^aN = 29

^bN = 20

by certain individuals only, and they engage in these activities to a greater extent than is indicated by the figures, which are averaged over the entire sample. For women, the principal craft activity is pottery, which is sold in the local markets. For men, approximately half of the observations are of crafts for home use, such as ropes or hoe handles. Three of the men are also leathermakers who market their products on a small scale.

Household duties take an average per day of four hours of a woman's time and one hour of a man's time during the year.¹⁰ For women, the greatest burden is food preparation, which requires 2.15 hours per day. About one-third of this time is spent in pounding or grinding grain. After food preparation, the provision of water demands more of a woman's household time, although female youths and children contribute a great deal to maintaining the household water supply.

Seasonality

The time allocation data presented in tables 1 and 2 are broken into wet season and dry season observations, and it is obvious that the differences in activity patterns are extreme. Because the farmers have no access to any type

of irrigation, from harvest in November until planting in April or May there is essentially no opportunity for any agricultural work, and this must be taken into account when considering total hours devoted to agriculture during the year.

With more time available in the dry season, both craft and trading activities increase significantly for women and less significantly for men. Female trading also increases in the dry season because there are more foodstuffs available for commerce and the markets are better attended. Craft activity increases for men during the dry season, although the number of hours devoted to local trading remains constant, as animals and petty manufactured articles—the principal items of male trade—exhibit a more stable supply and demand throughout the year. Women spend a bit more time on food preparation in the dry season because they have more time at home and because there is more food available in the months after harvest. In the wet season, local streams provide water for household use, but in the dry season women and children must go considerable distances to find water, and time devoted to this activity increases notably. During the dry season, the time for house building and repair, men spend a great deal of time on these activities. In addition, because of the lack of local opportunities during the dry season, many men leave for southern Ghana to find a few months of work. It must be borne in mind that the activities reported here are of those who remain behind. Of the 20 adult males in the sample, 6 left to work in the south during the dry season of 1976-77.

Summary of Results

These data from northern Ghana tend to confirm the importance of seasonality, nonfarm activities, and women's roles to understanding agricultural labor allocation in Africa. Adults work full days in this community—6.7 hours for men and 7.8 hours for women. These totals account only for activities performed between 6 A.M. and 7 P.M. and do not include visits to other communities, trips to market, ritual, or other activities important to the livelihoods of these people. The seasonal constraints in this area are extreme, as agriculture is virtually impossible during almost half the year, and seasonal differences in work patterns are evident from the data. Nonagricultural activities assume great importance here. Care of animals, trading, and crafts together account for about 45 percent of the time men and women spend during the year in activities other than household duties. Finally, the data underscore the importance of women's contribution to farming. The average woman spends about two-thirds of the average adult male time working in the fields, but if one considers that there are more women than men in the sample, it is possible to say that the total female contribution to farming is equal to that of males. There are, of course, many parts of Africa where this is the case, but northern Ghana is an area where women traditionally do little farm work.¹¹ Nevertheless, as declining soil fertility has demanded more intensive agricultural labor and as more men leave to find work in the south, women are assuming increasing responsibility for farm labor.

Comparison to Other Studies

The time spent by men in farming in northern Ghana is higher than in

many other areas of savannah West Africa. In studies done in 3 zones of northern Nigeria, average yearly farm work by males was under 2.2 hours per day.¹² Only in the peak month did average hours per day worked on the family farm rise to 5.5. A study in southwest Kano State, Nigeria, shows even less time devoted to farming, ranging from 1.4 to 1.8 hours per day, depending on the income class of the farmer; daily hours worked on the farm during the 3 peak months ranged from 2.29 to 3.50.¹³ In a Gambian village growing groundnuts, rice, and millet, men worked only about 1.45 hours per day in farming while women worked about 2.60 hours.¹⁴

On the other hand, data from a study carried out in Mossi and Bisa villages in southeast Upper Volta, only 100 kilometers from the Ghana study, show men spending about 3.8 hours per day and women about 2.8 hours per day in farming.¹⁵ Taking into account the fact that part of this time for men (about 0.5 hours) is devoted to irrigated gardening, figures are roughly equivalent to those for men in northern Ghana. The figures for women are higher in the Upper Volta study, but this is not surprising, for there is more of a tradition among the Mossi and Bisa of female participation in farming.¹⁶

It is difficult to know how to explain the wide range in male labor time devoted to agriculture observed in these studies. The lower figures for northern Nigeria, compared to northern Ghana and Upper Volta, may be due to the lower labor demands of permanently cultivated fields, higher use of plows for weeding, or more hired labor. Without more information, however, it is impossible to make a judgment on the importance of these factors. The question of labor use by field size, for instance, has not even been touched upon here, but as the Ghanaian landholdings are smaller than those in the other areas, agricultural man-hours per hectare are certainly highest in Ghana.

Methodological Considerations

Because all of the other studies reviewed above employed an interview technique in which farmers were visited several times a week, it is not likely that the large differences observed in male farming time can be ascribed to method. There are some differences between the Ghana study and the others that may, however, be attributed to method. Thus, the estimate provided for Ghana of 5.7 hours per day in economically productive activity for men is significantly higher than the 3.5 hours estimated by Norman and others, or the 1.8-2.1 hours estimated by Matlon through recall surveys in northern Nigeria.¹⁷ It is interesting to note as well that although the study in Upper Volta showed higher average hours spent in agriculture than were noted for Ghana, time spent in almost all nonagricultural activities is lower than for Ghana.¹⁸ Although one cannot expect to make direct comparisons, the environments and economies of the two sites are similar enough to suggest that the differences are due at least in part to methodology; the random visits were able to pick up more nonfarm activities than were the interviews.

A recent study on women's time allocation, conducted in two Mossi villages in central Upper Volta, provides evidence that the random visit method compares favorably with direct observation.¹⁹ Twelve women were studied in the wet and dry seasons by an observer who recorded all activities over a period of 48 hours. Table 4 presents the results, which, when they are

TABLE 4
FEMALE ADULT TIME ALLOCATION IN GHANA AND UPPER VOLTA
(Hours per Day)

ACTIVITY	DRY SEASON		WET SEASON	
	Ghana ^a	Upper Volta ^b	Ghana ^a	Upper Volta ^b
Farming	0.2	0.0	3.7	4.5
Animals	0.1	0.0	0.1	0.0
Craft	1.1	2.8	0.3	0.0
Trade	1.4	1.9	0.7	0.9
Household	4.6	4.1	3.4	3.3
Total	7.4	8.8	8.2	8.7

^aData obtained by random visits (see table 2 for definition of activity categories).

^bData obtained by direct observation. Calculated from Bleiberg et al., "Duration of Activities," table 3, p. 76.

compared to the equivalent figures from northern Ghana, exhibit a high degree of correspondence.

The fact that the random visit method of recording time allocation brings the researcher in contact with all activities, not merely those suspected to be of importance, is one of its primary advantages. That women spend 0.8 hours per day during the wet season working on minor crops, or that men spend more than 0.8 hours per day during the entire year caring for poultry are facts that are likely to be overlooked in an interview. Furthermore, the method is able to provide data on activities of all household members. This advantage is particularly important in assessing the contribution of women and children, for interviews often rely on reports of the male household head regarding the activities of other household members. In northern Ghana, the increasing importance of women in agriculture, for instance, is not always fully acknowledged by the men. Observational techniques such as this are also particularly valuable when people have difficulty conceptualizing time spent on various activities, especially those carried out sporadically during the day, such as craft work or care of animals. Finally, it is a method that has relatively low time and personnel requirements and that makes few demands on the members of the study population.

The method is not without its disadvantages, however. Although the total time required is very low, the investigator must be present throughout the study period. Because it is based on direct observation, this method requires assurance of access to all household members' activities, and there are situations where this would be difficult. Unless the number of observations is very high, the method provides data only in general categories of activities and is not suitable for estimating time spent in activities that are of short duration or take place during a very limited part of the year.

There is obviously a need for more information on the labor patterns of rural West African populations, and the issue of appropriate methodologies is an important one. The random visit method, examined here, has been shown to be an effective way of providing a broad picture of yearly time allocation in a northern Ghanaian farming community. The results would suggest that techniques relying more on observation and on innovative ways of sampling activity patterns not only offer opportunities for reducing costs

of studying time allocation but also for opening up research to the entire range of activities that are important to rural populations. In the present case, we learn that, although time devoted to conventional farming activities is not terribly high, people are nonetheless fully occupied. The nature of these other activities must be understood before one can hope to plan meaningful development programs.²⁰ There are undoubtedly situations where more detailed farm management studies are necessary to analyze particular problems, but one cannot help but feel that for the most part, as Hill says, we should be "concerned rather more with identifying the important variables than with measuring their movements."²¹

NOTES

¹ John H. Cleave, *African Farmers: Labor Use in the Development of Smallholder Agriculture* (New York: Praeger, 1974).

² Uma J. Lele, *The Design of Rural Development: Lessons from Africa* (Baltimore, MD: Johns Hopkins University Press, 1975), p. 23.

³ Robert Tripp, "Economic Strategies and Nutritional Status in a Compound Farming Settlement of Northern Ghana" (Ph. D. diss., Columbia University, 1978).

⁴ The farms sampled were in a relatively more densely settled part of the community, so they may be somewhat smaller than the true average, but the Ghana Ministry of Agriculture ("Report on Current Agricultural Statistics," Accra, 1975) reports an average holding of 1.05 hectares for Navrongo District.

⁵ Examples from West Africa include: David W. Norman, David H. Pryor, Christopher J. N. Gibbs, *Technical Change and the Small Farmer in Hausaland, Northern Nigeria*, African Rural Economy Paper #21 (East Lansing: Michigan State University, Department of Agricultural Economics, 1979); Peter J. Matlon, *Income Distribution among Farmers in Northern Nigeria: Empirical Results and Policy Implications*, African Rural Economy Paper #18 (East Lansing: Michigan State University, Department of Agricultural Economics, 1979); Christopher L. Delgado, *Livestock Versus Foodgrain Production in Southeast Upper Volta: A Resource Allocation Analysis* (Ann Arbor: Center for Research on Economic Development, University of Michigan, 1979).

⁶ Examples of intensive observation techniques from West Africa include R. H. Fox, "A Study of Energy Expenditure of Africans Engaged in Various Rural Activities" (Ph. D. diss., University of London, 1953); and Fanny M. Bleiberg et al., "Duration of Activities and Energy Expenditure of Female Farmers in Dry and Rainy Seasons in Upper Volta," *British Journal of Nutrition* 43 (January 1980): 71-82.

⁷ Allen Johnson, "Time Allocation in a Machiguenga Community," *Ethnology* 14 (July 1975): 301-10. The method has since been employed in other studies of Amazonian societies; see Daniel Gross et al., "Ecology and Acculturation among Native Peoples of Central Brazil," *Science* 206 (November 1979): 1043-50.

⁸ Hours were selected with the provision that the hour not repeat itself in the same month, so that periods of observation would be distributed as evenly as possible. Once the schedule was fixed, it was adhered to rigorously. On six occasions an alternate day (randomly selected) was used because of a conflict in the research schedule (such as a visit outside the community) but not because of factors that would bias the observation (e.g., special community events or rain).

⁹ For discussion of these factors see John M. Hunter, "Population Pressure in a Part of the West African Savannah: A Study of Nangodi, Northeast Ghana," *Annals of the Association of American Geographers* 57 (March 1967): 101-14.

¹⁰ One important component of household duties that often requires a great deal of time, firewood collection, is not of any importance here. People rely entirely on the stalks of late millet and guinea corn to provide their fuel.

¹¹ Jack Goody, "Polygyny, Economy, and the Role of Women," in *The Character of Kinship*, ed. Goody (Cambridge: Cambridge University Press, 1973), p. 184.

- ¹² Norman, Pryor, Gibbs, "Technical Change," p. 38.
- ¹³ Matlon, "Income Distribution," p. 76.
- ¹⁴ Margaret R. Haswell, *Economics of Agriculture in a Savannah Village*, Colonial Research Studies #8 (London: H. M. S. O., 1953). Hours per day during the entire year can be calculated from data on hours per workday and workdays per year on pages 25, 37, 38.
- ¹⁵ Delgado, "Livestock Versus Foodgrain." Figures for labor time in various activities are presented in Appendix B only for age and sex categories, not for individuals, but use of household composition data allows one to make rough estimates.
- ¹⁶ See Peter Hammond, *Yatenga* (New York: Free Press, 1966), pp. 80-82, for a description of Mossi women's participation in farming. When questioned about their recent participation in weeding millet and sorghum, the women in the northern Ghana study would often reply, "We learned it from the Bisa."
- ¹⁷ Norman, Pryor, Gibbs, "Technical Change," p. 38; Matlon, "Income Distribution," pp. 76-77. (The latter does not include work in the family compound.)
- ¹⁸ Delgado, "Livestock Versus Foodgrain." Estimating from household figures presented in Appendix B, it would appear that hours per day for males in nonagricultural tasks are divided roughly as follows: care of animals, 0.3; craft, 0.4; trade, 0.3; household duties, 0.3. For females: care of animals, 0.0; craft, 0.8; trade, 0.3; household, 2.1.
- ¹⁹ Bleiberg et al., "Duration of Activities," p. 76.
- ²⁰ This nonagricultural activity makes a great contribution to the welfare of these households. See Robert Tripp, "Farmers and Traders: Some Economic Determinants of Nutritional Status in Northern Ghana," *Journal of Tropical Pediatrics* 27 (February 1981): 15-22.
- ²¹ Polly Hill, "A Plea for Indigenous Economics: The West African Example," *Economic Development and Cultural Change* 15 (October 1966): 10-20.