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FINAL REPORT

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Mapping of Areas Liable to Famine in Bangladesh

(The Use of a Delbecq-Delphi Sequence
in an Incomplete Data Situation)

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1

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CONTENTS

Section 1:	What is famine in Bangladesh?
Section 2:	Why is Bangladesh liable to famine?
Section 3:	What is meant by areas liable to famine in Bangladesh?
Section 4:	Why is it necessary to use the Delbecq-Delphi process to map areas liable to famine in Bangladesh?
Section 5:	What is the Delbecq-Delphi process and how is it used to construct a map of areas liable to famine in Bangladesh.
Section 6:	How reliable is the map of areas liable to famine in Bangladesh constructed by the Delbecq-Delphi process?
Section 7:	How does the map of areas liable to famine produced by the Delbecq-Delphi Process relate to famine remedial policies for Bangladesh.
Section 8:	What can be done to improve such Delbecq-Delphi studies.
Section 9:	What are the limitations of this Delbecq-Delphi study of areas liable to famine in Bangladesh?
Section 10:	In what directions should this research proceed in Bangladesh and elsewhere.

A famine landscape - by Zainul Abedin
(courtesy of the Abedin Family, Dacca)

SECTION 1.

What is famine in Bangladesh?

SECTION 1

What is famine in Bangladesh?

Famine is a sudden reduction in the capacity of the community to sustain its poorer members.

The Famine Syndrome:

In 1947 A.E. Taylor highlighted the difficulty of giving an elegant definition for famine: "Famine is like insanity, hard to define, but glaring enough when recognised." In this treatise famine will be viewed as: A sudden reduction in the capacity of the community to sustain its poorer members. Some of the many causes and effects of this syndrome were suggested by a poll of four groups, each of 45 members, with experience of past famines in Bangladesh (Table lii). These same four groups, composed of village elders, retired government officers, aid distributors and technical experts, also suggested the critical points at which a scarcity (Akal) became a famine (Durvickha),(Table lii).

By sifting through these responses and by integrating them both with written accounts of past famines in Bengal and with my own experience during the 1974-75 famine in Bangladesh, I have suggested a conceptual model of the

Table lii

Rank	Village Elders	Retired Government Officers	Aid Distributors	Technical Experts
1.	1. No rice available in market	1. Increase in starvation mortality	1. Increase in starvation mortality	1. Increase in starvation mortality
2.	2. No food available elsewhere	2. When the government declares	1. Migration to urban areas increases	2. Migration to urban areas increases
3.	3. The rich are affected as well	2. Migration to urban areas	3. High malnutrition levels	3. High malnutrition levels
4.	4. Migration to urban areas	2. Meals are irregular and infrequent	3. After a natural calamity superimposed on a scarcity	4. No rice available in market
5.	4. Thoughts are irrational and only on food	5. Increase in the number and timing of beggars	3. No work for anyone	4. After a natural calamity superimposed on scarcity
6.	4. Increase in starvation mortality	6. When everyone has to be fed by relief	6. No rice available in market	6. Rapid rice price increase
7.	4. People eat leaves, grass, seeds and bonn kochu	6. People eat leaves, grass, seeds and bonn kochu	6. No food available elsewhere for relief	6. Increase in begging
8.	8. Meals are irregular & infrequent	6. Whole families have a skeletal appearance	8. Increase in begging	6. Meals irregular and infrequent
9.	8. No work for anyone	9. No food available elsewhere for relief	8. When government declares	9. No food available elsewhere for relief
10.	*	9. According to the famine code	8. A political decision	10. People eat leaves, grass, seeds and bonn kochu

*Note: Rankings are derived from the number of times the phrase is mentioned in answer to the question "When does a scarcity become a famine?"

famine syndrome in Bangladesh, (Figure liii). This syndrome is initiated by a series of assaults which lower a community's ability to withstand further assault. Many famine symptoms are suddenly brought into focus by the triggering effect of a natural or man-made disaster or a series of disasters. The disruption of agricultural production and storage may be real or speculated. It may be a combination of both. There is a rapid decline in the demand for paid agricultural labour. A sudden divergence occurs between the purchasing power of the community and the price of food. The latter may rise, but famine symptoms can occur without any increase in the market price of food, (Abed, 1976). Also a rapid increase in the market price of food need not imply a famine: as long ago as 1875 Sir William Wilson Hunter pointed out that

> *"The mere doubling and trebling of prices of rice is not indicative of famine; merely of profiteering by the misfortunes of other districts."*
>
> (Hunter, 1875)

Members of the community who cannot afford to purchase their food supply may either increase their purchasing power by borrowing, begging, stealing, or else by selling or mortgaging their own possessions in a buyer's market. They may opt to change their diet. The new diet may provide less nutrition which, when combined with disease, may increase mortality. Some community members may opt to leave the community in the expectation, perhaps unjustified, that employment and relief are available in the larger towns and

THE FAMINE SYNDROME IN BANGLADESH

CAUSES (see Chapter 2)			SHORTAGE SITUATION	SYMPTOMS		
Long term	Recent	Immediate		Primary	Secondary	Tertiary
Poor production Low efficiency in using production Lack of storage in using production Isolation	Running down of social, economic, and administrative structures	An environmental disruption or sequence of disruptions	An unusual shortage e.g. food, or perceived shortage may coincide with an interruption of agricultural activities. Unemployment or underemployment reduces the purchasing power of the poorer sector. In some instances this reduction in purchasing power may coincide with an increase in commodity prices.	Borrowing Begging Stealing Selling Mortgaging Changing diet Migrating Accepting aid	Acute protein calorie malnutrition Epidemic disease Concentration, congestion and disease transmission	Increased death rate

Figure Ii'i

cities. There, the abnormal concentrations of often malnourished people, crowded together in unsanitary slums (bustees), offers the potential for epidemics and thus may further increase mortality.

As an example of this syndrome, Figure lii describes the occurrence of famine in part of Bangladesh in 1974-75. In a country where rice is the staple food, the official average price of coarse-grained rice had been rising steadily from a figure of 70 takas per maund (U.S. $158.00 per ton) in 1972. In August 1974 the average price of rice took a sudden upswing. Although official figures and aggregated prices undoubtedly dampened actual bazaar prices, the national average price of rice tripled in taka terms between October 1972 and October 1974, to 210 takas per maund (U.S. $780.00 per ton).

After a lag of two months, this sudden upturn in the rice price that had begun in August 1974 was followed by an abrupt increase in the number of unclaimed dead bodies that were collected from the streets of Dacca, the capital city, for burial by the Anjuman Mufidul Islam, a charitable Muslim burial society (see Figures liv). There was no expansion of the burial society's services, but their records indicated a fourteen fold increase in the number of street deaths: from 50 bodies per month in September to over 700 bodies per month in December 1974.[1]

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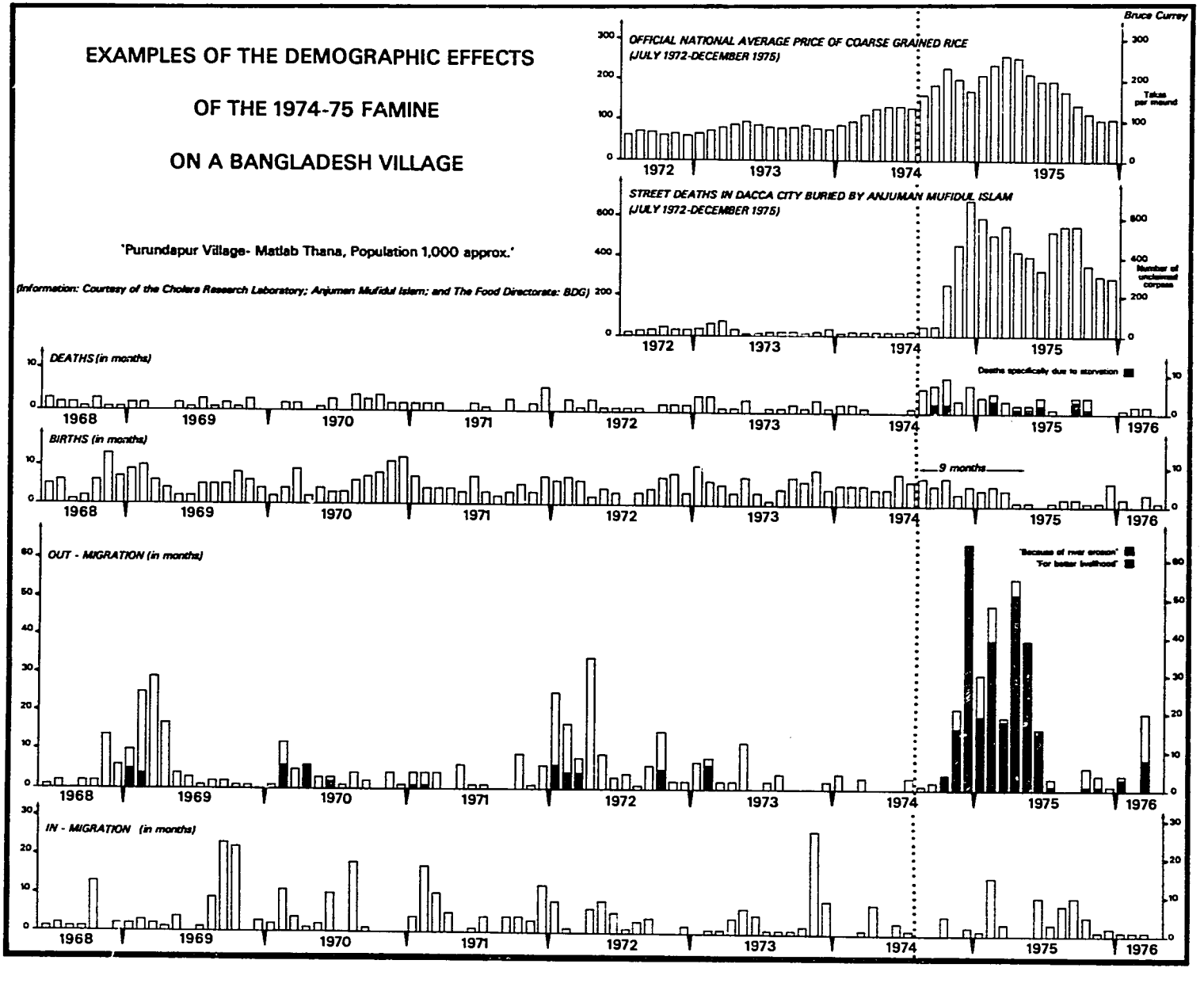
[1]The existence of a dysentery epidemic in Dacca during the months preceding and following this sharp rise might lead one to suggest a causal relationship. However, the epidemic admission records at Dacca cholera hospital clearly indicate that the timing of the epidemic did not coincide with the previously noted increase in mortality. Moreover, the curve of street deaths rises much more steeply than the epidemic curve, further suggesting that the two events were not causally related.

EXAMPLES OF THE DEMOGRAPHIC EFFECTS OF THE 1974-75 FAMINE ON A BANGLADESH VILLAGE

'Purundapur Village- Matlab Thana, Population 1,000 approx.'

(Information: Courtesy of the Cholera Research Laboratory; Anjuman Mufidul Islam; and The Food Directorate: BDG)



12

Although there were no denominators to the figures of the burial society, the shape of the curve has strongly suggested a cause outside the city. Some phenomenon or phenomena within the capital's catchment area had suddenly increased the population at risk to mortality in Dacca.[2]

In Purundapur, a village of about 1,000 people in a cholera field trial area less than 30 miles from Dacca, the demographic symptoms recorded at the same time in 1974-75 (see Figure liv) were reminiscent of those noted in the 18th and 19th century parish and district records of the now developed areas of e.g. England (Wrigley, 1968), Finland (Jutikala, 1955), France (Ruwet, 1954), Japan (Office of General Affairs, Chumbo Province, 1898) and Sweden (Thomas, 1941), i.e., high death rates, lowered birth rates and out-migration.

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[2]Note: a) In 1976 the Anjuman Mufidul Islam's records in Dacca again fell to below 100 street deaths per month.

b) The decline in street deaths in April, May and June 1975 may have been due to the unofficial removal of the bustee dwellers (bastuharas) to planned camps outside the city limits in March 1975.

c) Similarly the second increase in July and August 1975 may have been due to the unofficial return of the bastuharas and to the influx of unemployed landless labourers during the wet season, after the harvesting of the summer rice (aus) crop.

d) Although the Anjuman Mufidul Islam served very few of the minority Hindu population, the Anjuman officials claimed that the records of the Satkar Samiti burial society followed the same general trend.

Between August 1st 1974 and July 31st 1975, the number of deaths recorded by the village midwife (dai) in Purundapur increased from an annual average for the preceding years of 19 per thousand to 53 per thousand. Eleven of those 53 deaths were noted as being due specifically to starvation. After the normal 9 month gestation period the number of births dropped noticeably from an average of 55 per thousand per year during the preceding 6 years to only 20 per thousand during the 12 months after 1st May 1975.

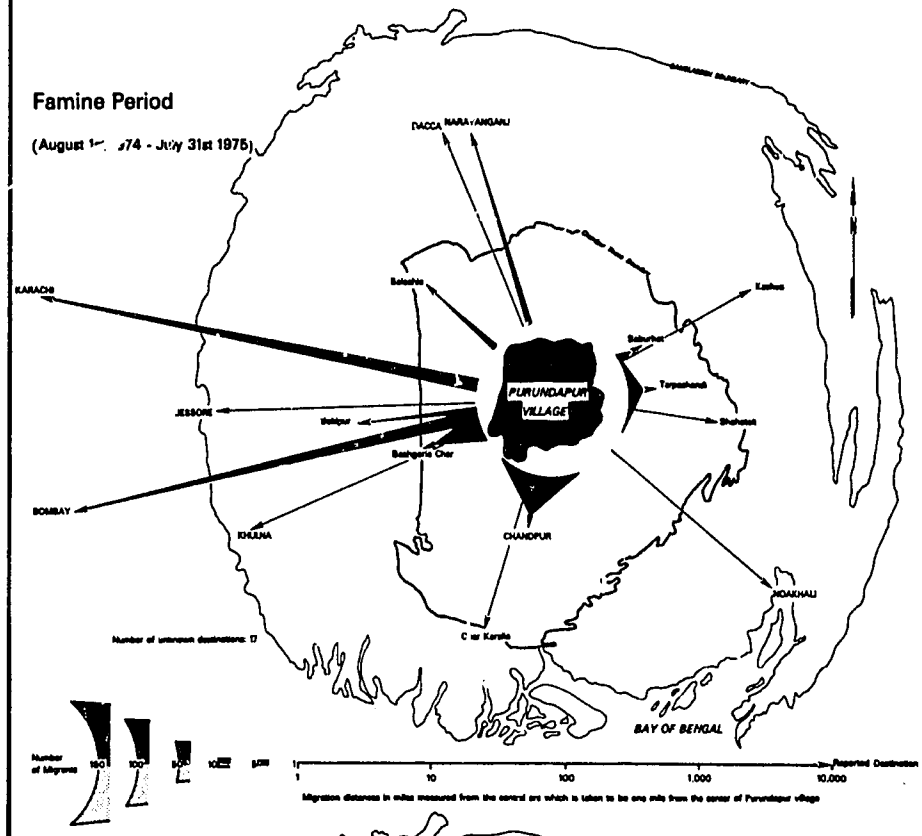
The most sensitive indicator was "out-migration" (see Figure lii) which leapt from an annual average of 62 per thousand per year during the previous six years to 303 in the twelve months immediately after 1st August 1974 without any corresponding "in-migration" being recorded. This out-migration clearly reflected an extreme or crisis situation when compared with the previous rural exodi, a) as people returned to the cities after the urban political unrest over the Agartala Conspiracy at the end of Ayub Khan's Pakistan regime in late 1968 and early 1969, and b) as the migration from villages back to Dacca city began in early 1972 at the end of the liberation war (see Figure lii). In the 12 months after 1st August 1974, out-migration was not recorded as being in search of food. Seventy eight percent of the outmigrants during that 12 month period were recorded as having left for a better livelihood, thus suggesting poverty-induced migration and the inability of the community to support its rural poor. The migration

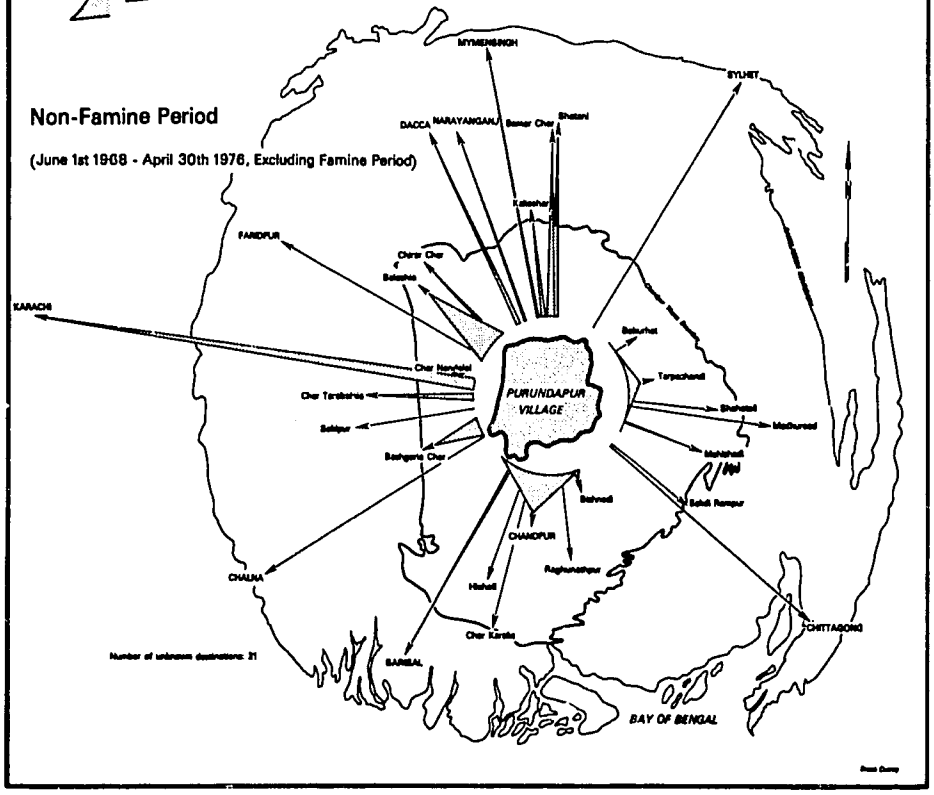
OUT-MIGRATION FROM A BANGLADESH VILLAGE

PURUNDAPUR VILLAGE (Population about 1,000) MATLAB THANA

(Data Courtesy of the Cholera Research Laboratory, Dacca)

Note - The national and thana boundaries and the migration distances are distorted by the logarithmic transformation of distance





15

recorded as being because of river erosion suggests only one of the many causes of the famine syndrome in Bangladesh.[3]

The magnitude of this "out-migration" is further stressed in Map li where the total breadth of the arrows on both maps emphasises that out-migration during one famine year (1st August 1974 - 31st July 1975) was almost equivalent to seven years of normal out-migration (1st June 1968 - 30th April 1976, excluding the famine period). Out-migrants during the famine period reportedly headed for destinations[4] similar to those of normal times, including places as far away as Karachi, which is over 2,000 miles away. This probably suggests both that they were making links with already established contacts and that famine has impact over very distant areas. The subtle change differentiating the famine from non-famine conditions, as reflected in the maps, is the decrease of rural destinations during the famine period. Out-migration became channelled towards the urban areas, as the ability of other rural communities to support additional members was reduced. The proportion of the out-migrants moving to Chandpur during the famine period increased. Chandpur is the road, railway and riverboat terminal for the cities of Dacca and Chittagong.

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[3]The causes of famine in Purundapur are discussed more fully later in Section 2.

[4]The destinations are only those reported to the daiis by the migrant's family, relatives or neighbours in the same village. In many cases they may have been guestimates or only the first stopping place.

SECTION 2.

Why is Bangladesh Liable to Famine?

Bangladesh: A Famine Vulnerable State

The Unstable Landscape

> *And there shall arise after them seven years of famine,*
> *And all the plenty shall be forgotten in the land of Egypt;*
> *And the famine shall consume the land.*
> (The Bible, King James Version,
> Genesis: Chapter 41 Verse 30.)

Just as Joseph was able to interpret the pharaoh's allegorical dream to anticipate famine in Egypt, so he might have predicted famine for Bangladesh by interpreting the image taken from a heaven 9.5 kilometers high by the Earth Resources and Technology Satellite (see Photo map, Figure 2i).

Bangladesh is a small country of 55,126 square miles, couched in a downwarp between the Himalayan piedmont to the north and the Bay of Bengal to the south. The green vegetation hues of the Arakan Yomas mark the north and eastern boundaries respectively, except for the two districts of Chittagong and Chittagong Hill Tracts which intrude into the Eng *(Dipterocarpus spp.)* forests of Burma and Tripura State (India). The western boundary, delimited by the Radcliffe Award in 1947, bisects the old province of Bengal. It is not so discernible because it cuts south, dissecting natural regions with administrative callousness from the piedmont alluvial plains in the north and then across the Barind Tract. It makes a foray eastwards to within 10 miles below the contentious Farakka Barrage, which affects surface water and salinity patterns downstream in Bangladesh. Finally, the western boundary bisects the high plain of the moribund

delta before losing itself in the Sunderban Forest on the Bay of Bengal. That encircling land boundary from the Naf River in the southeast to the Raimangal River in the southwest is traced through a distance of 2,483 miles. When added to the intricate and ever changing sea boundary of 445 miles, this provides almost 3,000 miles of border for potential smuggling and currency trafficking.

Within the boundary, even from on high, the river courses stand out in the reverse color infra-red image, their white sand-flecked braidings testifying to the dynamism of the river system. The three main rivers, Padma (Ganges), Jamuna (Brahmaputra) and Meghna, gather 1,073 million acre feet of snow melt and rain water, and an estimated 2.4 million tons of sediment load per year from their 600,000 square mile combined catchment area (IBRD, 1971). The catchment includes the areas of rapid deforestation (Eckholm, 1976) in the Himalayan foreland, northern Deccan, Himalayan-Tibetan Plateau and the northwest Arakan Range. Shorn of their velocity by the low gradients within the country (on the average: 0.3-0.6 feet per mile; IBRD, 1971), they drop their sediment burden as riverine and deltaic chars (newly emerged lands), and as levées and backswamps during the monsoon floods.

By the time the satellite passes over again, 18 days later, the pattern of braiding visibly changes (Wingert, 1974). The rivers have been known to erode over a mile of bank in one year (Coleman, 1969). Despite its apparent aimlessness, the Jamuna has been moving westwards from its

first documented course, when it flanked the western end of the Garo-Khasi escarpment before turning south through Sylhet. Later it followed the old Brahmaputra course through Mymensingh, but between 1787 and 1830 it diverted to its present steeper Jamuna channel during an abnormal flood. Perversely, the Padma has countered the Jamuna's general westward movement through history by moving its estuary eastwards. It has left behind a trail of decaying and moribund deltaic features, such as bils (marshes), khals (narrow channels) and oxbow lakes. The Meghna is not such a volatile river; in its floodplain course, it has the lowest gradient of all (less than 0.06 feet per mile downstream of Bhairab Bazaar). The extremely low gradient permits the backwater effect of the tides to penetrate as far north as Sylhet City. It also forms a holding area and bottleneck for flash floods from the Garo-Khasi escarpment to the north and the Arakans to the east. The isostatic depression occupied by the Sylhet haors (water filled depressions) holds flood overspill throughout the year (e.g., the satellite image, Figure 2 i, taken in February still shows large areas of standing water). During the wet season, the Sylhet Basin becomes an inland sea eighty miles long. Other extensive water retaining depressions are also evident in the Chalan Bil (swampy lake), in Rajshahi and Gopalganj Bil in Faridpur. The two outliers of higher land, the pleistocene-sediment-covered plateaux of the Barind and Madhupur tracts, are picked out by the lighter

vegetation hues resulting from their good drainage characteristics. The intervening graben occupied by the alluvial Jamuna flood plain is thought to have been formed by tectonic activity associated with the forcing of the Indo-Australian Plate below the Himalayan zone of the Eurasian Plate (Toksoz, 1975; Molnar and Taponnier, 1977). This is continuing, and causes the ever-present, but poorly perceived, earthquake risk in Bangladesh today (Morgan and McIntire, 1959; Brammer, 1975; Wilson, 1972).

The Bangladesh landscape presents to the newcomer a timeless and somnolent agrarian scene. In fact, appearances are deceptive. Bangladesh is characterized by change, including long-term tectonic movements (Berry, 1976), medium and short-term riverine shifts, seasonal vicissitudes of the monsoonal climate, as well as sudden environmental extremes or hazards such as floods or cyclones.

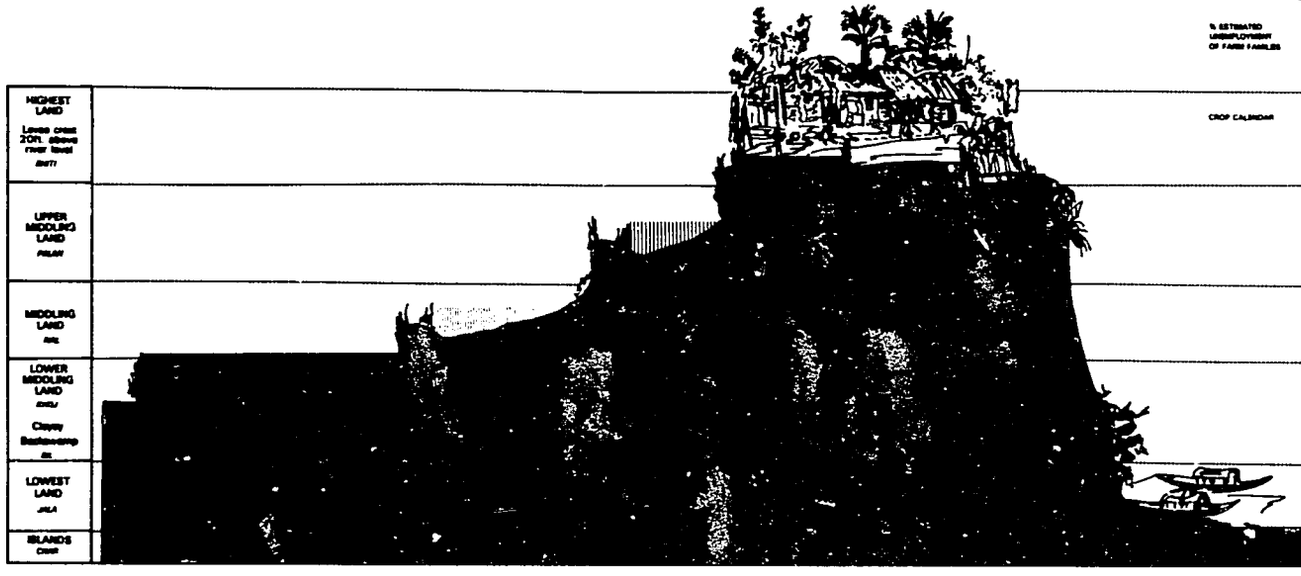
The Meshing of the Seasons

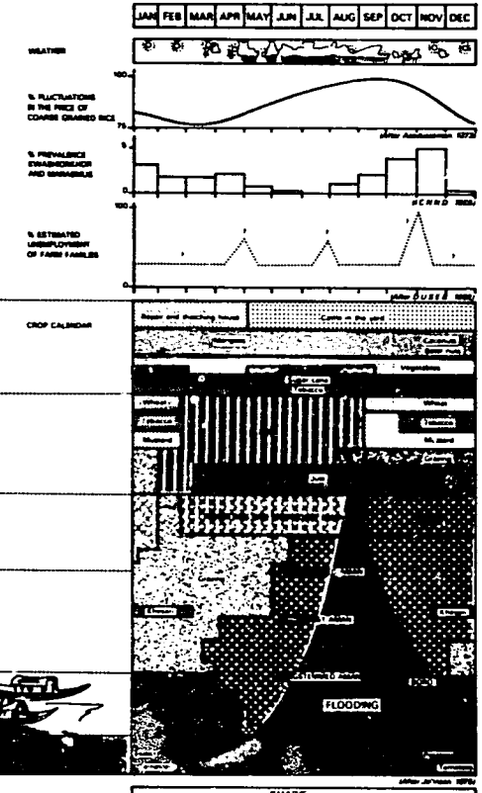
In Bangladesh it is not the quantity of precipitation, but its distribution throughout the growing seasons, that is the more important criterion in determining famine vulnerability. The country is well endowed with precipitation and exotic run-off, but shifts from the average seasonal distribution of precipitation disrupt the agricultural, social and economic calendars (Figure 2 ii)

The annual isohyets curve eastwards around a low of 60" on the western border in southwest Rajshahi and Kushtia.

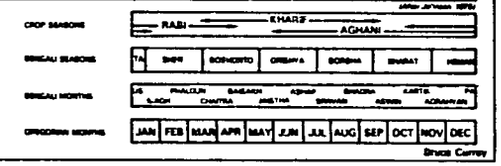
BANGLADESH

THE DELICATE BALANCE OF MAN, LAND, SEASON AND FOOD





NOTES:
1. THE CROP AREAS ARE RELATED TO ELEVATION AND SEASON.
2. THE SOWING AND HARVESTING OF CROPS ARE RELATED TO FLOODING AND RAINFALL PATTERNS.
3. RICE PRICES, EMPLOYMENT AND NUTRITIONAL STATUS ARE RELATED TO HARVESTING TIMES.
4. THIS MULTIPLE CALENDAR IS ONLY HYPOTHETICAL. IT IS COMPILED ON THE BASIS OF SEVERAL SOURCES FROM DIFFERENT REGIONS. EACH COMMUNITY'S MULTIPLE CALENDAR VARIES ACCORDING TO ITS PARTICULAR SITE AND SITUATION.



Bruce Currey

22

There, the precipitation is only barely adequate for reliable wet season rice cultivation. The isohyets rise northeastwards and southeastwards to high rainfall areas of over 200" per annum in the hill areas of north Sylhet and southern Chittagong district. About 80% of these annual totals fall during the five monsoon months between the last week in May and the end of October. The annual precipitation totals are relatively constant (Conrad, 1941) as reflected by the low coefficient of variability[1] for monsoon precipitation of 9, the lowest in the subcontinent (Das, 1972). Although the variability in the total precipitation is low, however, the critical "onset times" do vary. Awshomoi Brishti (untimely rainfall), especially that associated with the southwest monsoon's onset which may vary from May 27th to June 23rd, affects crop regimes adversely, especially those of the staple paddy rice.

Crop damage during the kharif (rainy) season from March to October, usually results from precipitation falling outside the region in the river catchment areas upstream. Runoff from these different catchments peaks at different times; the Meghna normally peaks first in May and June, the Brahmaputra in July, and the Ganges in August (IBRD, 1971). Changes in the rainfall regime in the upper catchments can alter the river hydrographs downstream. The synchronization

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[1] Coefficient of Variability = $100\% \times \frac{\text{standard deviation}}{\text{mean}}$

of the Brahmaputra and the Ganges flood peaks, for example, caused the severe flooding around Dacca in 1974 (Ralph, 1975).

Early, late or heavy rainfall within the country, in combination with the soil infiltration rates, the water holding capacity of the soils, the evaporation rates, and the stage of development of the crop (e.g., germanating or flowering), also endanger crop yields in both the kharif (rainy) and boro (dry) seasons. The aus[2] (summer rice) normally sown between March and May and harvested between mid-July and mid-September is generally an upland rice, and susceptible to the lack of chotta barsak (early rains). A delay in these chotta barsak postpones the sowing of the aus or hinders its germination. This delay in turn delays harvesting and increases the aus crop's vulnerability to unusually high or early floods in June or July. Aus rice normally reaches its maximum height of about 2.5 feet before June. Any early flood water rising above this height and keeping the crop submerged for more than five days, will lessen yields by 40-50% (IBRD, 1972). During the months of March-May, the aus crop and the relatively flood resistant jute crop are regularly damaged by the hail, high winds and heavy rain that are associated with the nor'wester line-squalls (Kal Baisakhi, or calamities in the month of Baisakh) as well as by violent cyclones.

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[2]About 33% of the total paddy acreage.

Thirty percent of the aman[3] (winter rice) crop is broadcast with the aus in March and April. This broadcast aman is thus susceptible to the same hazards as the aus, but many of the long stemmed varieties, often 23 feet high and sometimes growing at 12 inches per day, can maintain sufficient "freeboard" to stay above all but the most rapidly rising floods. Sixty-five percent of the aman is not broadcast, but is transplanted from nurseries between July and September after sowing in June and July. This transplanted aman is very susceptible to submergence by flood water; severe damages occur after only three days of submergence (IBRD, 1972). Both aman crops are vulnerable to the recessions of precipitation during the monsoon. The second cyclone season between October and December may also lodge and rot the aman immediately prior to harvesting between November and January.

The boro (dry season) rice crop is planted out between November and February and harvested between March and May. It depends upon receding flood water, residual soil moisture, or irrigation. This dry season crop is vulnerable both to failure of irrigation systems and to early flash floods which inundate the low lying boro habitats first.

Just as cropping patterns are closely adjusted and dependent upon the monsoon climate, so seasonality of

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[3]About 60% of the total paddy acreage.

employment, mobility, food prices, and nutritional levels are dependent on the cropping regime (see the hypothetical multiple calendar, Figure 2 ii). If sowing or harvesting is cancelled, delayed or reduced, it means increased under-employment or unemployment for the cultivators, especially the landless laborers. It means less wages, whether in cash or kind. Sowing and harvesting necessitate large scale seasonal movements of laborers to labor-deficient areas like Sylhet and Noakhali. This means high short-term concentrations of people in areas to which they are not accustomed, and hence, increased vulnerability in the event of a disaster. Many food-deficit areas like Faridpur depend on the "rice salaries" brought back from Sylhet by the harvesting labor. Food prices and nutritional levels fluctuate with the seasons. Even in good years, there is a lean period before the aman harvesting: foodstocks are at their lowest level and the prevalence of kwashiorkor and marasmus in children under five increases by 250% between July and November (ICNND, 1966).

Awshomoi brishti (untimely rainfall) and ill-timed flooding dislocate the delicately balanced agricultural calendar, and thus lengthen the "lean season" if they do not precipitate a famine crisis. Although such seasonal compressions occurring in parallel are difficult to document, they are emphasized in Bengali folk lore and proverbs such as those in Khonar Bauchon ("The Words of Khona", Bidyaratna, 1971).

জৈষ্ঠ্যে শুকো আষাঢ় ধারা
শস্যের ভার না অন্তে ধরা॥

If the month of Jaistha is very dry
And Ashar is rainy
Then crops will be plentiful

খনা বলে শুনহে কামিনী
শ্রাবন ভাদরে নাইকো পানি
দিনে জল রাতে তারা
এই দেখবে দুঃখের ধারা॥

Khona is saying, listen mankind,
"If it does not rain in the months of
Sravan and Bhadra
And only rains during the day
Keeping the skies full of stars at night
Then your sorrows will begin."

চৈত্রে ঝড়ো ভাদ্রে বান
নরের মুণ্ড গড়াগড়ি যান॥

Storms in the month of Chaitra
And flood in Bhadra
Will bring human skulls on the ground.

Poverty

Bangladesh is a poor country, it is one of the 40 poorest countries in the "fourth world" (Hansen, 1976) with a real income per capita of only $80 per annum in 1973 (World Bank Group, 1975). It is among the poorest of the poor countries. For example, while the poor cultivators in West Bengal live in red brick-tiled and brick-walled houses, their counterparts in Bangladesh must make do with leaking thatch and cane. Indeed, that real income per capita of $80 masks the disparities between the gold laden saris worn at functions at the Hotel Intercontinental in Dacca, and reports by Bengalis themselves of the sharing by three

village women of a single threadbare sari as their only modest covering in the extreme dusprya (difficult times) of 1974. This level of subsistence is described statistically by Alamgir (1974), who estimated that in 1968-69 there were already 50 million Bengalis living below the "poverty line" (equated with the earning equivalent of a minimum consumption basket of 2,100 calories and 45 grams of protein per person per day). More recently, Alamgir (1977) estimated that in 1973-74 there were as many as 64 million people in rural areas of Bangladesh surviving below a minimum living standard.

What little wealth there is in Bangladesh, is found in its land and people. If there were a utopian equity of land distribution and equal productivity throughout the land, there would be less than 1.5 acres of land per household, which would mean less than 0.3 acres per person. Those households fortunate enough to own the average 1.5 acres may rent an additional acre from a more wealthy neighbor, but the total holdings are fragmented often into ten or more plots. Many Bengalis do not own any land. In the early 1970s the proportion of farmers classified as landless was estimated at 40% (Abdullah, Hossain, and Nations, 1974), but recent unofficial reports put the figure as high as 60% in some areas (Januzzi,1977). The landless laborers, when working at the peak seasons of harvesting or sowing, earn about 1 seer (approximately 1 kilogram) of rice per day or two full meals instead, plus an amount of money equivalent

to another seer of rice to buy his family's food (Rahman, 1976). In other seasons they work for food alone, without the extra seer of rice. During those slack seasons, less than one in four will have employment (IBRD, 1972). Furthermore, these low incomes have been dropping since the early 1970s. The real income of unskilled agricultural laborers dropped by about 30% between 1970 and 1975 (Alamgir, 1977). The fall in real wages was caused by the 100% increase in the rice price over the same period. (Chen and Chaudhury, 1975) (see Figure 2iii)

Trends in the wholesale price of coarse rice and real wages of agricultural labourers(1966=100)

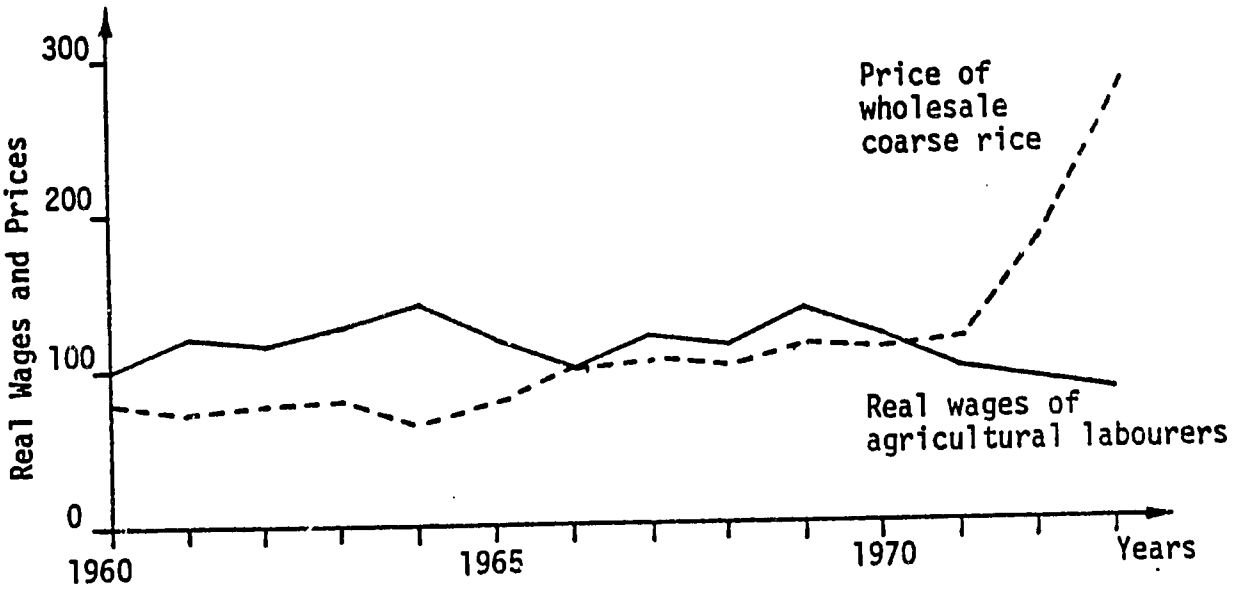


Figure 2iii

The increased polarization of wealth (McNicoll, 1975) and increasing pauperization leaves rural economic conditions in a state where

> *...even a slight impact of an unfavorable exogenous force may seriously jeopardise the chances of survival*

> *(of the poor). They are caught in what may be called the "Below Poverty Level Equilibrium Trap". The trap exists between the poverty line and the famine line... The famine line is the level of consumption below which the probability of death is unity* (Alamgir, 1977).

Although it is the poor who fall below this "famine line", the group most sensitive to famine (i.e., those where the effect may be most easily measured) are not the destitute, but those with some possessions to lose or sell off in the market glut (Mahalanobis, 1946).

Against this background of poverty, moral actions often seem to clash with survival economics. Babies were occasionally sold during the famines (Hunter, 1868; Ghosh, 1944), and the guardian-less women resorted to prostitution in efforts to support surviving family members. Many of the lowest paid government workers were not paid for periods of six months in 1975. The salary of a Circle Officer for Development (the senior administrator for a thana) was insufficient to support his family of five with rice alone. Was it corruption when he failed to distribute a Persian relief blanket?

A Population at Risk

International estimates of the 1977 population of Bangladesh suggest a figure of 83.5 million (IBRD, 1974) with an estimated rate of growth between 2.7% (Population Reference Bureau, 1977) and 3.01% (IBRD, 1974). The rapid population growth, resulting from the sudden decline in mortality after the stabilization of agriculture and the food marketing

system in the 1930s and 1950s (Mosley, 1975), certainly provides Bangladesh with a potential resource (Harvey, 1974), but at present it constrains development and places increasing numbers of people at risk to famine. The population is now a highly dependent one, both on its own proportionately small workforce and on outside food supplies.

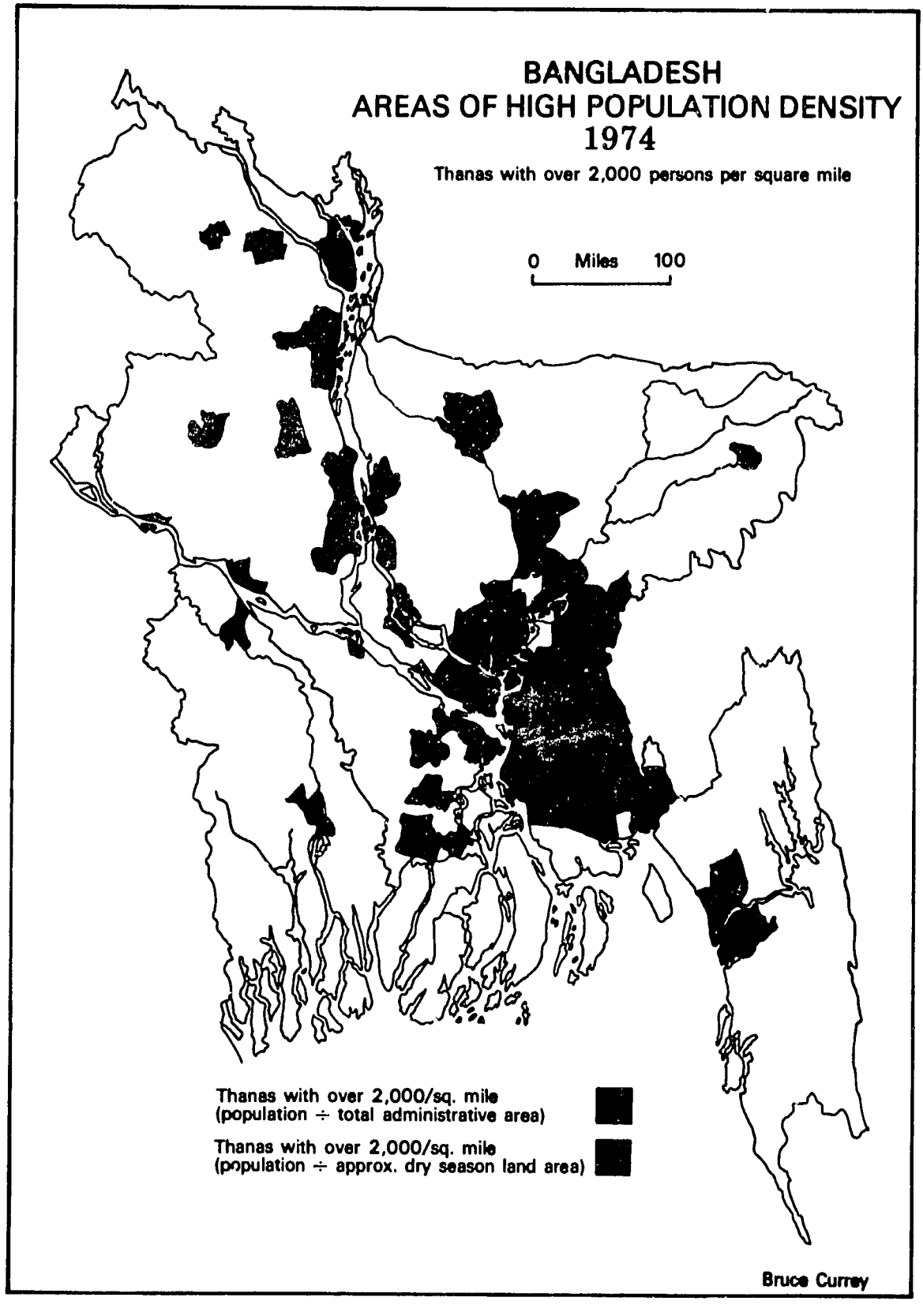
Standard dependency ratios, indicating the percentage of the population under 20 years of age and over 65, relative to the population aged between 20 and 65 (Bogue, 1969), have little meaning in a country where a woman may have borne six children by the age of 20, children below 10 are among the highest paid silk weavers, and male cultivators do not retire unless disabled. With 50% of the population aged below 15, only 34.73% of the population was classified as part of the civilian labor force aged 10 and over in 1968 (IBRD, 1974). By 1973, the labor force in Bangladesh was 26.3 million (Dorfman, Alamgir and Tabors, 1972). By the year 2000, this potential labor force will have reached 64-70 million. Present unemployment, even excluding underemployment, is already estimated at 30%, and by the year 2000 it would reach 35% even if all the presently envisaged employment opportunities were provided (Thomas, 1972).

Although the 75% of the labor force involved in agriculture have raised foodgrain production from about 11 million tons per annum in the mid 1960s to about 14 million metric tons in the mid 1970s, and annual imports have increased over the same period from about 0.5 to 2.0 million

metric tons, still the per capita availability of foodgrains waivers around 450 grams per day (Chen and Chaudhury, 1976). This average foodgrain availability per capita figure does not illustrate the real consumption patterns which are skewed by the purchasing power of the consumers (Levinson, 1974). The national nutrition survey in 1962, a relatively prosperous year, revealed that 46% of the population were classified as consuming inadequate quantities of calories (ICCND, 1965). Foodgrain availability figures also fail to account for nutritional losses within the body because of intestinal parasites, recurrent diarrheal illness, and fevers (Mosley, 1975).

Pressure on the traditionally intensive agricultural areas is forcing people to live in marginal and vulnerable areas (Brammer, 1975). This redistribution may be "cushioning the impact of the deteriorating food situation" (Chen and Chaudhury, 1976) but the "push" (Haq, 1975) or "forced extrusion" (McNicoll, 1975), from the densely settled areas, may be only a short-term mortgaging of the future. The areas whither they move are also vulnerable to disruption. Rural population is migrating out of the densely populated districts of Chittagong, Noakhali, Comilla and Dacca (see Figure 2 iv); some move to the urban centers, either temporarily or permanently (the population of urban centers grew at 11% per annum between 1961 and 1974), often to squatter conditions (Qadir, 1975), and others move to less populated rural districts where there are "larger farm sizes,

lower man-cropping area ratios, and higher levels of per capita rice production" (Chen and Chaudhury, 1975). The rapidly growing districts are the peripheral, sparsely settled districts on the older part of the Bengal delta, particularly Kushtia, Dinajpur, Jessore, Rajshahi, Rangpur, Bogra and Pabna (Elahi, 1976). These are the districts with low cropping intensities: while the central districts of Dacca and Comilla had crop rotations of mixed aus, deepwater aman, and rabi, the recently growing districts are characterized by an aus, transplanted aman, and fallow rotation. The districts of Kushtia, Jessore, Dinajpur and Rangpur, as well as being relatively remote from Dacca, are also relatively prone to drought. Bangladesh's riverine districts with a proclivity for floods, embankment bursts, sediment dumping, and bank erosion now carry high population densities despite their low cropping intensities caused by the long period of potential inundation. These high riverine population densities are little recognized because the National Census Commission (Bangladesh Census, 1976), the World Bank (IBRD, 1974), and the Dacca Geography Department (1975) fail to compensate for Bangladesh's riverine character when calculating thana population densities and mapping the resulting patterns (Map 2ii). They compute thana population densities by dividing the thana population by the total area of the thana. Recalculation of the thana population densities, after subtracting planimetered measurements of the approximate dry season river areas from the denominator for each

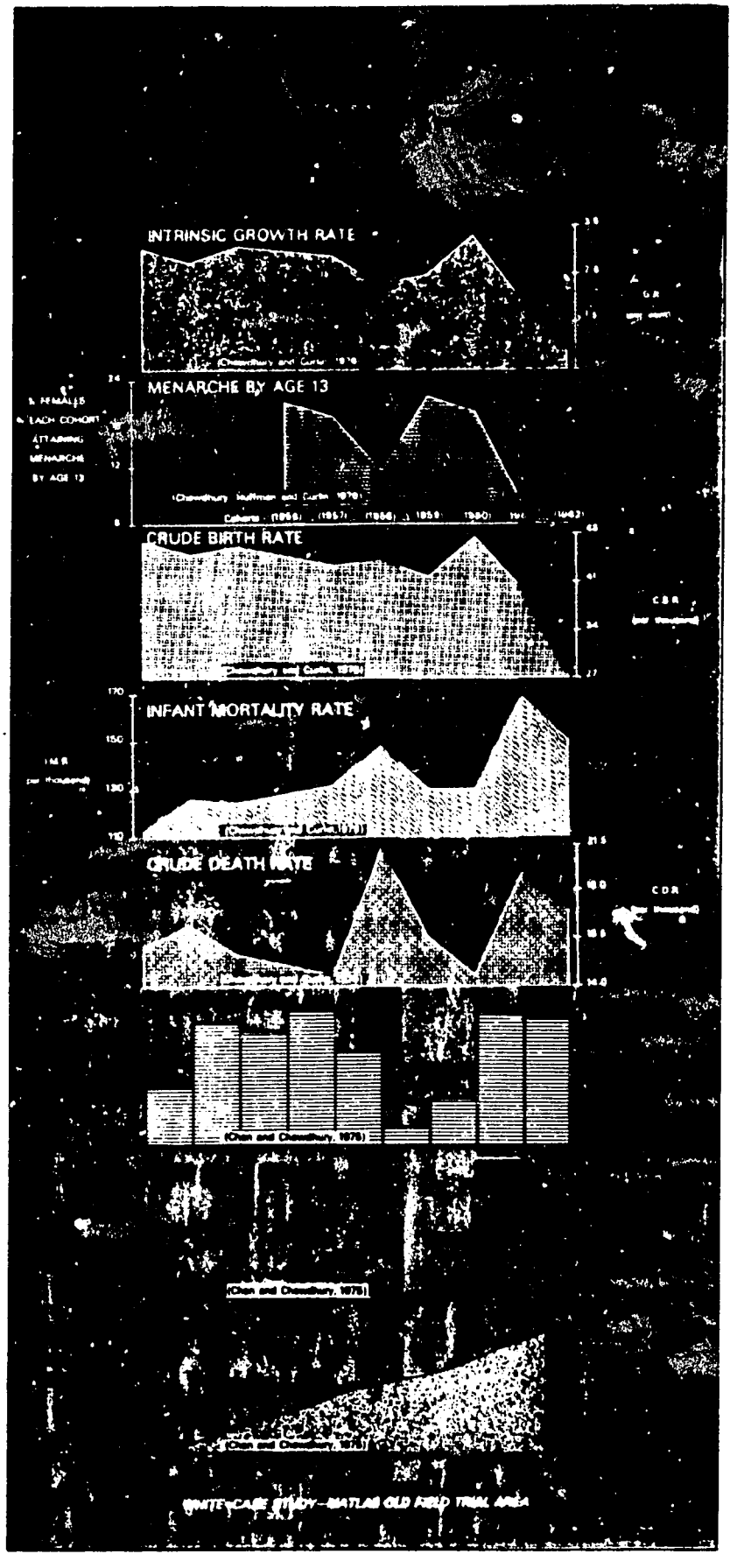

BANGLADESH
AREAS OF HIGH POPULATION DENSITY
1974
Thanas with over 2,000 persons per square mile
0 Miles 100
Thanas with over 2,000/sq. mile
(population ÷ total administrative area)
Thanas with over 2,000/sq. mile
(population ÷ approx. dry season land area)
Bruce Currey

thana, reveals a consistent pattern of high population density along the vulnerable Ganges and Brahmaputra riverine areas. During the annual floods, which on the average cover one-third of Bangladesh (Ralph, 1976), the areal denominator for calculating population density becomes even less in the flooded area. The baris (households) are left on island mounds clustered linearly among trees on the recent and relic levées of the delta. Even in 1936, Geddes (1937) estimated levée population densities at 30,000 persons per square mile. The levée densities have increased since then and I surmise that those families building anew at lower elevations nearer the rivers and towards the interfluvial bils (lake swamps) are generally the poorer, and hence more vulnerable groups. These depressing, possible interrelationships between poverty, vulnerability and elevation were exemplified by the location of two of the rehabilitation camps outside Dacca City in early 1975. The bastuharas, or slum dwellers were driven out of Dacca by the paramilitary Rakhi Bahini in a cosmetic cleanup operation. They were resettled in rehabilitation camps at points where the daily return bus fare to Dacca for work would be prohibitive for them. The camps for these destitutes were erected during the dry season, but they were sited below normal monsoon flood levels.

Figure 2v shows that the precarious balance between food and population in the early 1970s responds inelastically to major disruptions of the food supply system

(Chen and Chaudhury, 1976). Although both the "ecological fallacy" and the "atomistic" or "contextual fallacy" (Susser, 1973) may be invoked in considering the juxtaposition of national and "case study" (black profiles)(white profiles) trends (Figure 2v), there is a consistency of correspondence between the signs of stress and the disruption of the food supply during the 1971 war of liberation and the flooding followed by famine in 1974. Although not all confounding variables are removed, there is a strong association between major social and environmental disruptions and decreased growth rates. The black profiles of the national statistics in Figure 2v show that although the food supply system was disrupted in 1971 and 1974, the amount of imported food grain and the per capita foodgrain availability was relatively high in Bangladesh in 1974.

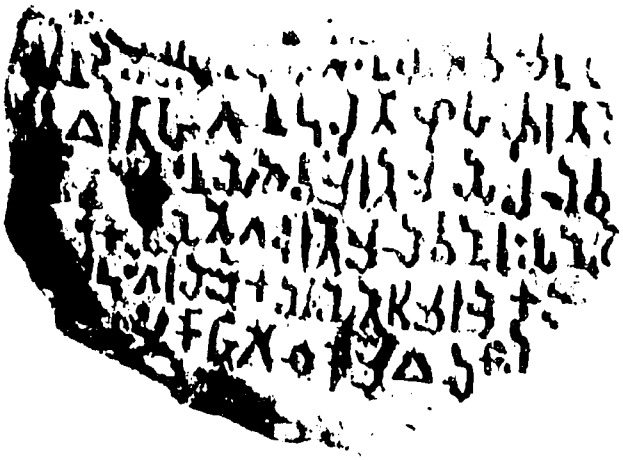
The white profiles (Figure 2v) constructed from census data on 112,000 people in the old cholera field trial area in Matlab thana, Comilla District, show that the crude death rates in 1971 and 1974 rose 50% above the rates for the previous years (Chowdhury and Curlin, 1976). Infant mortality rates are shown to have risen consistently with peak rates of 146.6 per thousand, and 167.2 per thousand in 1971 and 1974, respectively. In the wake of the two crisis years, the crude birth rate dropped. It dropped slightly to 41.8 per thousand after the war of liberation (see also Curlin, Chen and Hussain, 1976), and then plunged to 27.6 per thousand in 1975 after the flood and famine in 1974 and early 1975.



WHITE-CARE STUDY—MATLAB OLD FIELD TRIAL AREA

THE MAHASTHAN TABLET

Evidence of relief administration in the 4th century B.C.



Transcript

nena Sa(m)va(m)giy(a)nam (Galadanasa) I Dunadina-(maha)
mate I sulakhite Pudanagalate I e(ta)m
(ni)vahipayisati I Samva(m)giyanam (cha di)ne (tatha)
(dha)niyam I nivahsati I da(m)g(a)tiyay(i)k(e) d(eva)-
(tiya)(yi)kasi I su-atiyayika(si) pi I gamda(kehi)
(dhani)(yi)kehi esa kothagale kosam (bhara)-
(niye)

Translation

"To Galadana(Galardana) of the Samvamgiyas...(was granted) by order. The Mahamatra from the highly auspicious Pudranagara will cause it to be carried out. (And likewise) paddy has been granted to the Samvamgiyas. The outbreak (of distress) in the town during (this) outburst of superhuman agency shall be tided over. When there is an excess of plenty, this granary and the treasury (may be replenished) with paddy and the *gamdaka* coins."

Note

This inscription containing 7 lines in Brahmi characters of the Mauryan Period on a piece of hard limestone measuring 3.3" by 2.3" by 0.9" was discovered at Mahastangarh village near the Karatoya River in Bogra District, North Bengal on the 30th November 1931. It was found near a high mound which may have been a royal granary (Bhandarkar,1931).

The Mahasthan tablet (Figure 2vi), found in North Bengal and dated around 350 B.C., details

> *...a Mauryan Ruler's orders to relieve the famine distress of the Samvangiyas....settled in and about the town....by cash and rice loans....to tide over the distress* (Bhandarkar, D.R. 1931).

In "The History of Indian Famines", Srivastava (1968) documented similar relief actions throughout Bengal in Moghul and British times. Recent speculation about the growth of a "relief mentality" is, therefore, either a passing fashion or else a reaction to the new dependence on the recent sucession of massive scale United States and United Nations relief operations (USAID, 1974; UNDRO, 1976). Such a reaction to these recent bilateral and multilateral aid schemes may result from a number of important causes: from the magnitude of the schemes and the ensuing fears of their long-term impact on the rural economy[5]; from discontent at the presence of highly paid expatriate monitors who sometimes have limited effectiveness (Rohde and Gardner, 1973); from the untimeliness of relief arrivals from distant sources, e.g., the U.S.A., Canada, Australia, and the E.E.C. countries compared with former imports from India and Burma; from the

---

[5]Cash for work projects: the infusion of cash <u>may</u> inflate market prices for those who are not fortunate enough to be employed on the project;

Food for work projects: the infusion of foreign grains <u>may</u>, by depressing local market prices, act as a disincentive to local cultivators.

ment cooperatives (Raper, 1970). These cooperatives, if active (Emmert, 1977), encourage village cooperation and organization to raise loans through the Thana Central Cooperative Association (TCCA) to stimulate village development by the implementation of new irrigation, agricultural, and occasionally educational projects. Although informally linked by virtue often of joint membership, the KSS is completely separate from the relief distributing union parishad. There is presently no government administrative structure to channel relief funding into self-help schemes for development. The restricted opportunity for development immediately prior to the outbreak of famine is not conducive to self-help schemes without strong local organization, or without the catalyst of some outside stimulus. The villagers are caught in McNicoll's (1974) "prisoners' dilemma" where even though each villager knows he would benefit by cooperative action to improve embankments, construct irrigation bunds, or plant bamboo groves, he does not cooperate because he also knows that if he individually initiates a community project without being matched by the other village members, then he will be worse off.

Relief is not new to Bangladesh, but the scale, source, and methods of implementation have changed recently. Relief is not some novel western technological discovery imposed on a pristine culture in balance with nature's cyclical vicissitudes {compare Waddell's findings on Australian relief to the Enga tribespeople of New Guinea (Waddell, 1974 and 1975)}.

The only traditional organizations left in the village today are the sirdars, maatbars, morolls, or murubbis (elders) of the samage or former panchayat (council), and the moulvis and mollahs (Muslim priests and religious scholars). Both the elders and the priests are held in respect as counsellors rather than as organizers. Although they used to feel responsible for the welfare of the village, their authority has been eroded recently by factionalism (Zaidi, 1970). The traditional panchayat was partly formalized and included in the government structure by the Chowkidari-Panchayat Act of 1871 to become the union panchayat or union parishad, the lowest level of local government responsible for policing and taxing the union. The union parishad acts as the relief distributor for the villages of the union, particularly to the "D Category" inhabitants, those with little or no land and a large number of dependents, and usually those not on the union parishad tax roll (Rahman, 1976). The union parishad, however, has only 9 elected representatives, but there might be over a dozen grams (villages) per union, and therefore some grams are without direct representation in gaining access to relief. Particular grams might have several members on the union parishad and this may result in a political, rather than a humanitarian distribution of resources. In a minority of Bangladesh villages, the Integrated Rural Development Program (IRDP) has encouraged the formation of self-help organizations, the Krishi Samabaya Samiti (KSS), based on the Comilla model of rural develop-

khamin links tend to be nagat relationships which are casual and require immediate reciprocation, or hat relationships where the tie is only in the form of a cash-goods market transfer. Even the dhara relationships have been shown to collapse under famine conditions in other areas of India (Jodha, 1975; Epstein, 1967). The jajman patrons suspend or delay (often by moving or absenteeism) their commitments during the crisis. In Bangladesh where the nagat and hat relationships are even less binding, the relationship may break down almost as soon as conditions begin to deteriorate.

The traditional fall back position in times of need in Bengal was the zamindari system {the landlords of Moghul times were replaced by nonagricultural banias (middlemen) who were then given increased and undefined revenue collecting powers by Lord Cornwallis' Permanent Settlement of 1793 (Mukherjee, 1975).} This feudal system did act as a form of aid in hard times for at least one season of crop failure (Brammer, 1975) as the landlords were able to draw on external merchant stocks to relieve their own hari (vassals) in return for later service. The landlords were traditionally Hindu and in 1950, shortly after partition, the zamindari system was abolished[4] by the East Bengal State Acquisition and Tenancy Act (Government of Pakistan, 1966).

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[4]The Famine Enquiry Commission of 1945 had recommended the abolition of the zamindari system.

by the 1976 Faridpur tornado. These samaritan responses clash with my own observations of households starving immediately adjacent to apparently affluent families during the 1974 famine. The economic sharing among the extended family contracts; a destitute will seldom be given shelter during a famine for more than one night in a household of his own extended family. This survival ethic (compare Turnbull, 1974) even permeates the nuclear family during famine. Greenough (1976) provides evidence of the disintegration of the paribar (family) during the 1943 Bengal famine. He details the separation of husbands and wives in extreme situations and also the selling of children, documented elsewhere by Hunter (1968) and Ghosh (1944). In 1974 Aziz (1976) witnessed suckling children, with mothers absent, trying to suckle the grandmother.

At the community level, McAlpin (1975) has proposed that the jajmani system acts as an effective famine insurance mechanism in other areas of South Asia. An outgrowth of the hindu caste system, the jajmani system is one in which the jajmans (land controlling castes) are normally responsible for the protection and maintenance of the kamins (dependent castes)(Beidelman, 1959). In Bangladesh where the caste system has been dispersed under Muslim dominance, the jajmani system is less of a fixed or dhara relationship with a long-term continuance through inheritance (Greenough, 1976; Zaidi, 1970). Particularly with the high proportion of landless laborers and fishermen, the jajman-

of South Asia. The abolition of large landlords has probably removed one of the few remaining famine insurance mechanisms at the village level. Exogenous support systems in the form of relief, although long established, are at present poorly organized to cope with famines which occur infrequently and irregularly. In 1974 the relief system was particularly disorganized because of temporary corruption within the system, and temporarily impaired confidence between the donor countries and Bangladesh.

"Allah sends it, so only Allah can prevent it". This fatalistic attitude has been strongly associated with the Bengali perception of "rapid onset" disasters such as the 1970 cyclone (Islam, 1974). The areas affected by that cyclone were the coastal areas of Noakhali and Barisal, both traditionally conservative Muslim areas. The former, Noakhali, where Aminul Islam carried out his cyclone research, is the home district of many of the imams (priests) of the Dacca mosques. At a national scale, it is less likely that the succession of events which leads slowly to a famine produces so much turning to the sacred for aid. Famine is more probably attributed to such real or "scape-goat" profane causes as "bad government" or "unfavorable price structures".

Likewise, family units appear to respond differently to famine conditions as compared with intermittent disasters like tornadoes. I, myself, have witnessed villagers from an extended family bringing bhater handi (pots of cooked rice) from several miles distant to help those devastated

hypothesized by Austin and Levinson (1974); and Frisch (1972) has proved the necessity for critical body fat levels before menstruation can occur, but Chowdhury et al. (1976) have recently demonstrated the recent strong increase in the age at which menarche is reached in Bangladesh. Of the 1956 female cohort who had reached age 13 in 1969 before the stresses, nutritional and psychological, of the war, 21.1% were menstruating by the age of 13. Of the 1962 cohort who reached the age of 13 in 1975 after the war and after the famine, only 7.45% were menstruating by the age of 13.

After considering these few indicators available, and in the lack of contrary evidence, it seems that the Bangladesh population is particularly at risk to any major disruptions which impair food production, food supply, food consumption, or food absorption.

Faith, Hope and Charity

Traditional village and kinship sharing, whether religious or secular, appears to operate ineffectively during times of famine, and the vacuum has not been filled by external relief systems. Fatalism is less compatible with famine than with other disasters. Similarly, the extended family sheds its economic supportive links during the pervasive onset of famine. Even the sneho, or love support, of the nuclear family breaks down during the crisis. The traditional community systems of support during scarcity have never been so strong in Bangladesh as in other parts

The intrinsic growth rates declined from 3% in the late 1960s to 2.5% in the early 1970s, and then to the notably low figure of 0.9% in 1975. Chowdhury and Curlin (1976) have further calculated that 25% of the drop in the rate of natural increase in 1974 and 1975 was due to increased mortality and 75% to decreased fertility.

McKay (1974), in a case study of the mortality effects of the liberation war in the Sylhet district, found in comparing 1972 death rates with those from the period 1966-70 that deaths due to bacillary dysentery had increased 24 times, anemia 5.8 times, tuberculosis 3.8 times, pneumonia 2.9 times and malnutrition 3.1 times. All are nutritionally related diseases. Sommer and Loewenstein (1975), after an initial anthropometric nutrition study of 8,292 children aged between 1 and 9 in the Matlab area in December 1970, later followed the death rates in the different nutritional classes after 18 months. The 9% of the children who were classified as severely malnourished were later found to have death rates 3.4 times higher than the 50% who had been classified as normally nourished.

The reductions in fertility partially stem from the increasing median age at marriage which has risen in Matlab from 15.9 years in 1968 to 17.4 in 1973 (Aziz, Chowdhury and Mosley, 1970; Chowdhury, Huffman and Curlin, 1976), but the reduction stems predominantly from the drop in the marital fertility rate. Many of the linkages suggesting that malnutrition would lead to lower birth rates were

already described decrease in the "degrees of freedom" recently has both temporarily lowered the country's capacity to absorb such extreme events and has also increased the impact of the environmental forces when they do overspill the critical threshold levels, which themselves may be becoming lower.

History indicates that natural hazards have long been part and parcel of the Bangladesh landscape (e.g., Islam 1974). The "Ain-i-Akbari" by Abul Fazl-i-Allami (Jarrett, 1949), which chronicles events during the reign of the great Moghul emperor Akbar (1542-1605), refers specifically to "a terrible inundation...which swept over the whole of Bakla Sarkar (Bakergunj and Khulna) in 1584...amid thunder and hurricane of wind...(causing) nearly two hundred thousand living creatures to perish in the flood in Bengal Subah (division)". Since the beginning of the British period in 1757, the gazetteers and statistical accounts of Bengal compiled by the district administrators have documented cases of natural calamities, famines and scarcities. The gazetteer records are fraught with inconsistency, bias and incompleteness (see Chapter III). As an example, the 1943 Bengal famine is not mentioned in Noakhali, but that district is known to have been one of the most severely affected. (Mukherjee, 1944 and Mahalanobis et al, 1946). Some of the apparent anomalies are, however, explained in the text of the gazetteers, e.g., for Comilla the Eastern Bengal District Gazetteer states:

> *"In 1866 when Orissa and Western Bengal were visited by the worst famine of the country, the price of rice in Tippera (Comilla) rose to Rs.5 per maund, but this was paid by outsiders, and most of the people continued to eat their rice at the price it cost them to produce it, while they received a handsome sum for the surplus stock."*
>
> (Webster, 1910)

Similarly in 1896-97,

> *"The early cessation of the rains injured the harvest, but there was nothing approaching famine, hardly indeed scarcity".*
>
> (Webster, 1910)

Frequency patterns of famines, such as the apparent hundred year cycle (Figure 2vii) of (a) 1770, (b) 1870 and (c) 1970, must be treated with scepticism. They coincide with greater sensitivity to such events as:

(a) after the change to British rule,

(b) prior to the publication of two of the main sources in the 1880s, and

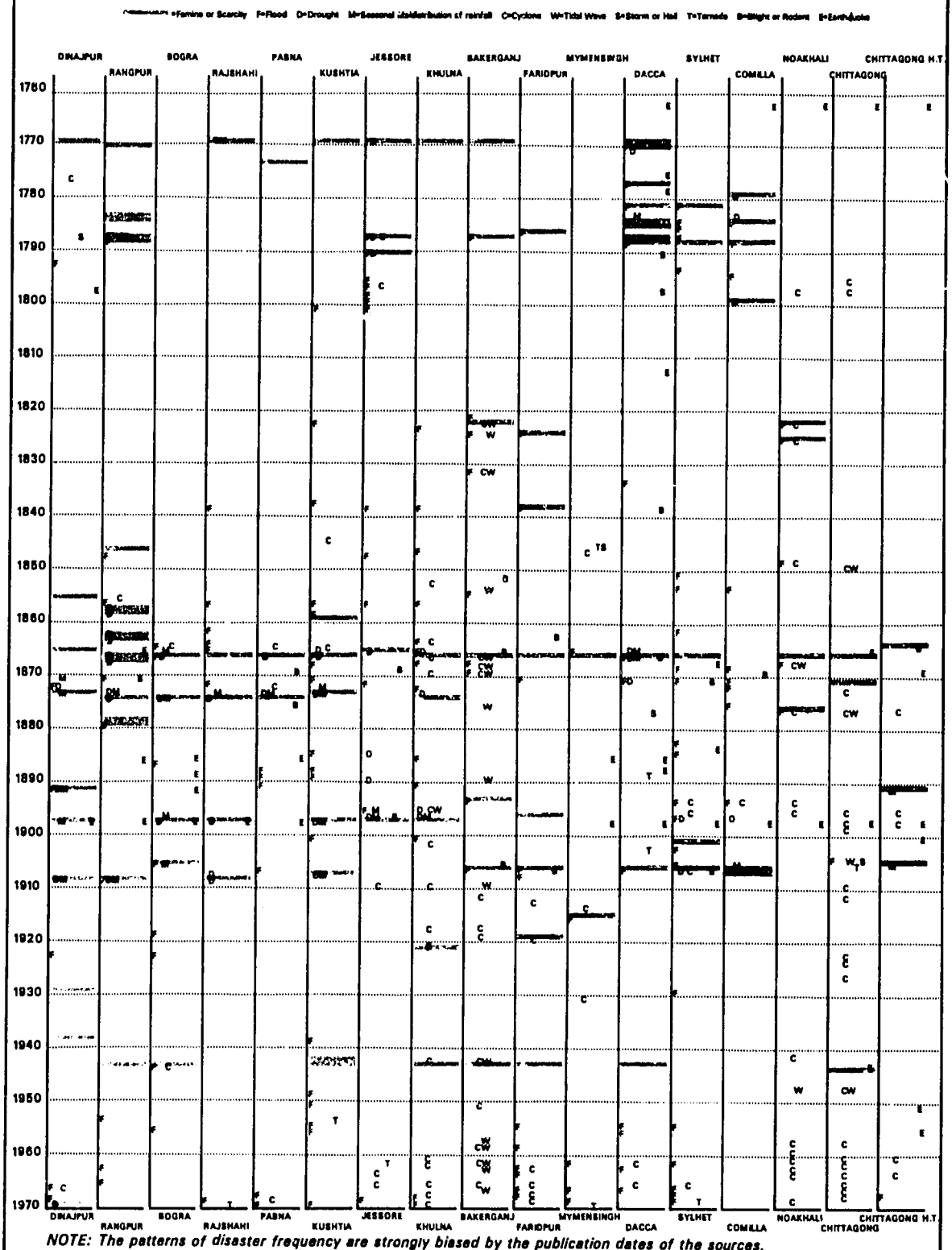
(c) before the publication of the latest sources.

The record does confirm that famine is not a new phenomenon in Bangladesh. Particular years stand out as having had widespread famines: 1769-70; 1787-88; 1866; 1874; 1897; 1907 and 1943. There is no evidence of an increase in either the frequency or scale of famine in Bangladesh. Although the numbers of people affected by the natural calamities and famines may be increasing, there is no evidence of an increase in their proportional impact. During the Bengal famine of 1769, there were estimates that one-third of the population perished, (Hunter, 1868). A century later, the

BANGLADESH

THE HISTORICAL RECORD OF NATURAL CALAMITIES, SCARCITIES AND FAMINES

17 DISTRICTS BETWEEN 1757 AND 1970



NOTE: The patterns of disaster frequency are strongly biased by the publication dates of the sources. The patterns of associated disasters, however, although probably slightly biased by the perspective of the reporters who were civil servants in the employment of the administration, are nevertheless valid associations.

Sources: A STAT. ACCOUNT OF BENGAL(1875-); IMPERIAL GAZETTEER OF INDIA (1885-); THE EASTERN BENGAL DISTRICT GAZETTEER(1905-); EAST PAKISTAN DISTRICT GAZETTEER(1961-); BANGLADESH DISTRICT GAZETTEER(1973-).

BRUCE CURREY

famine of 1866 is estimated to have claimed 135,000 lives, or 2-3 percent of the estimated population (Bhatia, 1967). Estimates of mortality of the Bengal and Bangladesh famines of 1943 and 1947 were as low as 3 percent of the population (The famine Inquiry Commission, 1945) and 0.1 percent of the population (Keesing's Contemporary Archives 1975) in the respective years.

The repeated juxtaposition of calamities and famines throughout the historical period strengthens the evidence of an association of famine with natural hazards. The latter appeared to "trigger" the former despite the agricultural abundance and food surpluses of the province as a whole, until the 1930s (Ahmed 1968). Although administrators in Government service were predisposed to associate famines and scarcity with natural calamities, as a scapegoat for administrative incompetence, over 70% of the recorded famines and scarcities occurred in the same year, or in the year immediately following, a recorded natural calamity. Famines certainly did occur without any natural calamity being recorded. Natural hazards also occurred without "triggering" famines; thus Sylhet appeared to have suffered from frequent flooding, but the ratio of flooding to famine was low. This may have been because of poor recording, or because the flooding occurred in a traditionally surplus area. It may also have been that frequent flooding in a food surplus area led to a response mechanism in which larger storage facilities were built to tide the

population over all except the periods of most extreme scarcity. (Brammer,1976). Certain disasters appear to "trigger" famines more than others. Floods and droughts were strongly associated with famines, unlike earthquakes which had little immediate effect, either on the standing crops or on the agricultural employment levels. The earthquakes may, however, have had a long-term effect by changing sediment patterns and river gradients, which in turn caused flooding, up to twenty years after the original earthquake elsewhere in the catchment area (Berry, 1976). A famine might have been recorded in several districts, but the actual natural disaster "triggering" it might have been different in different districts, e.g., the 1866 famine was apparently "triggered" by drought in Rangpur, but in the adjacent district of Bogra, the "triggers" included flood, drought, seasonally maldistributed rainfall and a cyclone. This does not imply, however, that natural calamities were not one of the intrinsic causes of famine, but merely that there were real variations in the many causes of famine. Famines in Bangladesh also appear sometimes to have been associated with a sequence of disasters, e.g. in describing the Rangpur famine of 1784,

> *"On the 28th May (1787) the Zamindars of Kuchwara... presented...(to...the collector)...a petition...which set forth that three months incessant rain entirely destroyed the spring harvest...The rain continued unceasingly and the cultivators were in great distress and were abandoning their fields in large numbers, while the cultivation of the winter rice crop was hardly possible, owing to the overflow of the rivers... The lowlands were entirely under water, (and) the*

incessant rain prevented the seeds from germinating, and that even the higher lands, which they had attempted to bring under cultivation, could not be properly attended or weeded, and that in the consequence of the growth of weeds or jungle, which had choked the rice, all such lands had been turned into pasture for the cattle...On the 29th July the Collector wrote...to the Revenue Board that the unseasonable rains which had commenced on the 26th March, which had (destroyed) the rabi crops on the lowlands, had entirely ceased for the past ten or twelve days...The fair weather was of short duration. The rains set in again with renewed violence on the 1st August, just as the cultivators were transplanting the young rice, the rivers again overflowed their banks.

But the worst was yet to come. The main branch of the Tista that in all times is an erratic river... suddendly swept down from the hills such masses of sand as to form a bar in its course, and bursting its bank it forced its way into the Ghaghar. The channel of the latter stream was utterly inadequate to carry off this vast accession of its waters, and the Tista accordingly spread itself over the whole district...on the 27th August. The waters at last subsided, leaving the winter rice crop...considerably injured. Six weeks of fine weather and the most careful attention to the young crop raised the expectation that the harvest might yet be a fair one. But the calamities of the season were not yet over, and a cyclone next swept over the stricken country early on the morning of the 2nd November, just as the (aman) rice was getting into ear."

(Vas 1911)

Despite the incomplete information the gazetteer records did emphasize the relative vulnerability of certain areas of Bangladesh. Rangpur, Dinajpur, Dacca and Faridpur districts stood out as having higher frequencies of famines and scarcities. Other districts were relatively free: notably Mymensingh, Pabna, Chittagong and Chittagong Hill Tracts. The accompanying text in the gazetteer records corroborates this scanty quantitative evidence. Thus the Bengal Gazetteer for Mymensingh points out that,

"(In Mymensingh) the people can never be seriously afraid of either flood or drought in sufficient quantity to threaten famine."

(Sache, 1917)

Similarly, O'Malley (1908), describes the vulnerability of Chittagong District in the Eastern Bengal District Gazetteer:

"The position of Chittagong, between sea and mountain, ensures a heavy and regular rainfall and guarantees it against those famines to which less favored tracts are subject. Shut in as it is on one side by the Bay of Bengal and on the other by hills and many hundreds of miles of forest country, there is a constant inrush of moist winds from the sea, which though subject to fluctuation, never fail entirely. There is a further safeguard against famine in the great variety of soils, ranging from high sandy tracts to low swampy marshes; for in a dry season the failure of the crops in the highland is counterbalanced by the fertility of the lowland. By terracing the fields as they slope downwards from the low hill ranges and by damming up the small streams which form after a few showers of rain, the cultivator can generally secure a sufficient supply of water for the irrigation of his fields. Consequently any failure of the harvests owing to drought can only be small and partial, and an extensive failure of the all important rice crop is unknown. A season of high prices is, indeed, not altogether unwelcome to the people generally, as most of them are cultivators keeping stocks of rice for their own consumption, and they are benifited by the high price they obtain for their surplus stock."

Unfortunately the historical record was not only incomplete, but it was also confined to the district scale. References to sub-district units were limited to short comments within the narrative, e.g., the Bengal Gazetteer of Bogra specifically mentioned that,

"the portion of the district west of the Karatoya river comprising thanas of Bogra, Sherpur, Shibgunj, Khetlal and Adamdighi and also partly in thana Panchbibi is most likely to suffer from failure of the rice crop."

(Gupta, 1910)

Each district had its own "set" or "mix" of disasters. Floods were ubiquitous, but droughts were seldom mentioned either in the coastal districts of Noakhali and Bakergunj or in the north east in Mymensingh and Sylhet. Earthquakes were recorded in the north and east of the country. Cyclones were certainly most frequent in the coastal districts of Khulna, Bakergunj and Noakhali, but they were also found away from the coast. They were recorded occasionally as far north as Rangpur, Dinajpur, Pabna and Mymensingh, but this may have been a misnomer resulting from local confusion between a cyclone and a tornado.

In 1975, Brammer listed twelve major natural hazards which still affect agricultural production in Bangladesh:

1. Floods
2. Droughts
3. Cyclones
4. Storm surges
5. River erosion
6. Burial by alluvium
7. Linesqualls (Nor'westers)
8. Hail
9. Saline incursions
10. Capillary salinity and alkalinity
11. Crop pests and diseases
12. Earthquakes

Diseases and epidemics are excluded because their effect on agricultural production is indirect. From the historical evidence available it is not possible to say whether the frequency of these hazards, especially flooding, is increasing, despite Eckholm's inferences suggesting such an increase (Eckholm, 1976). It is not yet proven even that sediment loads in Bangladesh rivers have increased significantly in the long term as a result of Himalayan deforestation. It certainly is not yet possible to predict any increase or decrease in the often complex successions of natural disasters which concatenate to weaken the rural economy.

The impact in terms of the immediate mortality caused by the natural hazards is certainly high, e.g., an estimated 225,000 people died in the 1970 coastal cyclone of November 12th and 13th (Islam, 1974), and it is probably increasing. Although the dollar impact per capita is low, e.g., $3.00 in the 1970 cyclone (Burton, Kates and White, 1977), because of the large population denominator, the resulting disruption to the social system and the development process is probably high; however, it remains uncalculated and perhaps unmeasurable. There are, as previously stated, more people now living in the vulnerable areas. Some are voluntary settlements and others are planned, e.g., the Noakhali *char* resettlement schemes of the mid 1960's. They may be temporary laborers or permanent settlers. They are often new to the vulnerability characteristics of the area, e.g., many of the new settlers on the Rangpur *chars* are from

the Mymensingh district. Also they may have to cope with the additional problem of litigation over land rights in the changing river environment: often being penalized by the law (Rakshit, 1956) or harassed by the hired *latials* (guards) of a more powerful party (Adnan, 1976). The intensification of crop rotations, yields and infrastructure in these areas increases the potential damage. Certain modes of development may also increase the effect of the natural event itself e.g., a thatch roof shatters in a tornado, but a corrugated-iron roof becomes a lethal weapon. Some development measures may have decreased the frequency of natural events, but they may also have unwittingly increased the impact of the occasional extreme event which exceeds the absorptive capacity of the preventive measure. Islam (1974) has documented the tragic consequences of storm surges breaching coastal embankments originally built to combat salinity inundation. Similarly one can speculate on the effect of fuel supply failures for the new deep tube-wells in North Bengal. Ralph (1975) interprets various official figures over the short time period, 1962-1970, to show that "severe damaging floods are occurring with greater frequency". She ascribes this not only to the increase in floodplain population, but also to greater damage reporting.

The threshold between "coping" and "crisis" has probably been decreasing in Bangladesh. For example, before the 1974 flooding the people were poorer, with less monetary and food reserves, they lived at lower elevations in the

flood vulnerable areas, and they were affected by a series of disasters: the 1970 cyclone, the 1971 war of liberation, the 1972 drought and the 1973 flood. These disasters may have sensitized the international community's response to the country, but it equally may have calloused local responses. The succession of disasters probably increased the number of vulnerable poor in the country (Mahalanobis, 1944). Rahman (1976) quoted his grandfather's warning to "keep enough surplus to tide the household over three crop failures". Since his grandfather's time, there are more in the household, there is less surplus to store, there are proportionately more living in the vulnerable areas who are dependent upon the surpluses in the non-vulnerable areas in times of distress. Although the marketing system has probably improved the ease with which foodgrains may be removed from an area in return for cash, I would speculate that the converse ability of the relief systems to return foodgrains to the area in times of need has not increased at the same rate, because it is not encouraged by a cash exchange. Grandfather Rahman's aphorism may have to be rethought in considering contemporary famine vulnerability.

The Essence of Bangladeh's Famine Vulnerability

What then are the main factors predisposing Bangladesh to famine? How do the components of vulnerability in Bangladesh differ from those in other countries?

A simple conceptual model may be used to structure such a summary by assessing Bangladesh's vulnerability in

terms of its production, the storage and savings capacity available to Bangladesh and the external and internal isolation of the country.

Production. Bangladesh's compact territory produces 98% of its foodgrains as rice. Its ability to produce its food is not falling because of soil erosion as is the case in many of the African states vulnerable to famine. In theory the tropical monsoon climate would permit three cropping seasons throughout the country, except for occasional weeks of low temperatures which might prevent the rice from flowering during the dry season. Irrigation is necessary in many areas during the dry spring season. Present rice yields of only about nine cwts. per acre are low compared with other south and east Asian states. The yields are increasing slowly. Extensive damage is caused intermittently by natural disasters. The growth in yields is restrained by the lack of incentives to the cultivator and the lack of knowledge about new techniques that were noted in Bihar. Lack of water at a national scale is not a problem. Drought, or insufficiency of total water available for plant growth, as opposed to seasonal maldistributions of available water, is at present a relatively minor problem confined to the west and north of the country. The major problem is a seasonal surfeit of water with floods intermittently affecting up to 40% of the country annually and creating a potential pre-famine landscape remarkably similar to those of the Chihli Plains in pre-Maoist China. Water surplus, however, unlike water deficit may be

viewed as a resource. That resource still remains largely untapped as a source of energy, as an opportunity for seasonal transport routes, as potential irrigation water and perhaps most important, as aquaculture and pisciculture areas.

Efficiency in using production. The majority of Bangladesh's large agricultural population lives in settled villages in areas carrying extremely high population densities, a situation very different from that found in the nomadic areas of the Sahel. The population was outgrowing food supply in the late 1960's and early 1970's. The new dependence on outside food aid is primarily a function of population growth, although food imports are more than equalled by post harvest losses caused by pests and poor storage. These internal losses have been occasionally increased by smuggling and individual consumption losses because of disease. Internal production might more than match population growth if the organization of the food system could be improved. Such improved organization would have to operate at and between all levels of the food production and distribution system. It would have to include the laborers, the landholders, the merchants, the bureaucracy and the policy makers. Similarly, improved organization might have the potential to make the growing population a productive asset rather than an increasing liability in terms of unemployment, poor health, and illiteracy.

Storage and savings. In economic terms Bangladesh is poor, with few reserves with which to take the risks of opportunity. Since independence, neither the individual cultivator nor the

nation has had large assets. Population growth itself has eaten into any reserves. There are still harvests providing surpluses but the ability to organize the storage and distribution of such surpluses appears lacking at both national and individual levels. The increased dependence on international food supplies makes it more susceptible to declines of stocks and increased prices in that external system.

Degree of isolation. Its relatively minor stragetic importance, although lessening the possibilities of massive "mutual security" aid that was available to many of the more strategically located, southeast Asian states, nevertheless, allows the country the benefits of non-alignment and multilateral aid links. History links Bangladesh with Europe, the United States and the Commonwealth. Islamic culture ties the country to Pakistan and the benefits of the oil-backed Islamic Development Bank. Increasingly, common problems and environments tie it with the Third World and especially with the People's Republic of China. Perhaps the most crucial links are those between Bangladesh and its neighbor, India. Strong Indo-Bangladesh relations will allow the nationalization of water problems, the improved control of border transfers, and the rapid transfer of appropriate aid in times of scarcity. For the present these aid links are crucial, especially in times of disaster. To maintain all the links effectively at critical times depends upon the credibility of the government in power. Within such a small country, few areas are traditionally isolated in the Ethiopian or Chinese sense, but in times of distress, railway

distances from the two ports of Chittagong and Khulna and political distances from the centralized bureaucracy in Dacca become paramount. The limited arterial roads and rail systems are vulnerable to floods and sabotage, and the waterways, although highly developed by the market sector, seem relatively little used for relief.

Examples of Famine Vulnerability Within Bangladesh

These characteristics of Bangladesh's famine vulnerability are particular to the state at the national scale, but at the village level, famine vulnerability has different components within Bangladesh. The following vignettes exemplify vulnerability in three villages in different areas of the country. They illustrate how different factors operated at different scales and different stages before the outbreak of famine symptoms in 1974.

The three sites chosen here as examples are Char Elahi, a newly emerged island in the Bay of Bengal; Purundapur Village on the banks of the Meghna river two miles north of Chandpur town; and Rowmari *Thana* on the border marches of eastern Rangpur (see Photo map 1).

Char Elahi. In 1967 the government of what was then East Pakistan resettled Muslim refugees from the areas of Agartola and Tripura in India on this recently emerged *char* island in the Bay of Bengal. Having lost all their land and property in India, each cultivator's household was allocated three acres of land which could only support one crop per year. All allocations were equal regardless of the number of mouths to be fed

in each household. In an attempt to settle this remote area with no road access, they were given the requirements for cultivation, their house, and 25 *takas* (about 2.3 U.S. dollars) for household utensils. These basic necessities, together with any interim savings, were lost in the November 12th-13th cyclone in 1970. Relief arrived bringing food, clothing and some shelter, but the relief also ceased, leaving them once again without savings and capital. They still had their three acres of land surrounded by a ten feet high coastal embankment. In the early 1970's the embankment fell into disrepair because of administrative breakdown and two years of unusually high water in 1973 and 1974 left a salt crust over much of the *char*. The saline deposits damaged the single crops of *aus* which the cultivators depend on for agricultural employment in the area.

Purundapur Village. In the late 1960's the meanderings of the River Meghna forced a community of Muslim fishermen to quit their *char* island and resettle on a levée in Purundapur Village on the eastern bank of the Meghna. They had no cultivatable land like the established villagers, but they had their houses, their savings and some had their fishing boats. The resettlement site was near the river port and subdivisional town of Chandpur so there were urban job opportunities especially in the grain trade. Their savings and storage levels dropped suddenly in the early 1970's after increasing tension between the newly arrived *char* people and the settled people of Purundapur literally reached flash point and the *char* people's houses and belongings were razed to the ground by fire. In

1974, Purundapur was reputed to be the only village in the *thana* that was "famine stricken" (see Figure liv). The richer villagers who had been settled there for a longer time, lost their *aus* crop and *aman* seedlings during the unusually high flooding and river erosion which removed over a half mile of land. This was especially severe since it occurred simultaneously with the contraction of credit. The *char* dwellers, who had already lost their capital in the fire, were even poorer in 1974 as fishing in the Meghna had been declining since the early 1970's. The irrational craving for rice during the crisis in 1974 reduced the market for fish and the fishermen sold off 50% of their boats. Those working in Chandpur brought back fewer wages as the grain trade contracted in response to the smaller rural demand.

Roumari Thana. This *thana* in the extreme east of Rangpur District in North Bengal is cut off from the rest of the district by the braided 10 mile wide Brahmaputra River. It lies between the Brahmaputra to the west and the Garo-Khasi escarpment to the east in India. Only a river strewn neck of land connects the southern side of the *thana* to Mymensingh District to the south. There are no roads for vehicular traffic except in the dry season when a precocious jeep can precariously balance its way along the remnants of embankments. Politically and physically, it would be the least likely *thana* in Bangladesh to receive capital investment for development. It was a bridgehead during the liberation war in 1971 for the Mukti Bahini to lead the Indian-backed liberation movement and

disturbances were widespread. After liberation, during the government of the late Sheikh Mujibur Rahman, it became a bridgehead again, this time for the smuggling of rice into India both across the border and along the *dacoit* (bandit) held Brahmaputra river. Some villages reported losing as much as 80% of their production over the border. Although this was undoubtedly an exaggeration when viewed at the aggregate *thana* level, smuggling undoubtedly exacerbated the *thana*'s difficulties after liberation. Flood levels were high in both 1973 and 1974. In 1974 there were six flood peaks which destroyed much of the *aus* harvest and *aman* seedlings. River erosion in Rowmari was minimal, except on the *char* islands because of its east bank situation. Burial by sand, however, prevented the planting of flood recovery crops and reduced the available grazing for the cattle on the *chars*. No planting and no grazing meant less available employment.

In all three of these examples, famine vulnerability was associated with natural hazards. In Char Elahi, there was the cyclone and later the salinity. The new villagers came to Purundapur because of nearby river erosion and in 1974, river erosion and flooding were the "final straws that broke the back" of the improverished community. Similarly in Rowmari, the unusually long lasting flooding and burial by sediment further reduced agricultural employment in a year of economic stagnation. In areas liable to natural hazards the likelihood of famine is considerably increased. The mapping of natural hazards by themselves will not allow prediction of where

famine will occur, but it will allow the dismissal of certain nonhazardous areas as being unlikely to be vulnerable to famine.

SECTION 3.

What is meant by areas liable to famine in Bangladesh?

What is meant by Areas Liable to Famine in Bangladesh?

This report does not propose to analyze the entire complex and dynamic concept of famine vulnerability for each village in Bangladesh. It restricts itself to analyzing the compar-tively static components (e.g., inaccessibility or flood prone areas) which coincide with the actual areas[6] liable to famine. Although superficially this appears to omit the less tangible process factors (e.g., inflation or changes in political ideology), the factors which are associated with the areal pattern of famine vulnerability at the regional scale in Bangladesh have in fact been relatively tangible and static, both in history (Figure 2vii) and at present (Brammer, 1975). This assumption is corroborated in the footnoting of the Bengal Famine Code (Figure 3i) which implies that a a map of areas liable to famine, once prepared, is relatively permanent unless specific changes occur, such as perhaps the building of an embankment or the change of a river course.

The areas liable to famine in Bangladesh are those areas with an inherent susceptibility to outbreaks of famine. They are the rural pockets in which localized famines are most likely to

occur and where the effects of nationwide famines are likely to be most severe. They are the areas where the famine symptoms outlined earlier are most likely to occur. Such areas are not necessarily the areas where chronic malnutrition is most severe. Neither are they equivalent to the "food deficit" areas where the population's food demand is greater than the local agricultural production.

To say an area is liable to famine is not to predict the occurrence of famine. Almost all parts of Bangladesh could, in particular and extreme circumstances, suffer from famine. [So could, and have almost all parts of the world (Walford, 1878 and 1879).] As an example of such an unpredictable area for a famine outbreak the border insurgency problems in the Haluaghat area of north Mymensingh District in early 1976 reportedly precipitated localized famine conditions (Jenkins, 1976). It is not yet possible to forecast that famine will break out in a particular area at a certain time. The eccentricities of nature and politics are still unpredictable. This inability to predict unforeseeable occurrences, such as border insurgency or a transport strike, does not, however, mean that famine is not more likely to occur in some areas than in others. Rather like life insurance, although we cannot yet predict the "who and the when", we can at least estimate the "where and the how many".

The concept of areas liable to famine is not new to Bangladesh. It has evolved as an integral part of the pre-plan analysis required before implementing the changing goals

of famine relief policy since the British period. The evolution of this famine policy may be grouped into four stages and is presently in its fifth stage, viz.:

1. Experimentation (1858-1879)
2. Formulation of the Famine Codes (1880-1900)
3. Preventive Policy (1901-1918) (Srivastava, 1968)
4. Stagnation (1919-1974)
5. Using famine as a stimulus to development (1974 onwards)

After the Bengal famine of 1866, the Scottish administrator, Sir William Wilson Hunter, sent out a questionnaire to each district officer in Bengal enquiring about the causes, severity, and potential relief works for famine in their district. The published report of this survey entitled "Famine Aspects of Bengal Districts" (Hunter, 1868), stressed that "different localities exhibit very different powers of resistance to the strain of famine".

In very superficial and summary form, these results were later included in the Imperial Gazeteer of India (1907) which stated under the section entitled "Famine: Tracts Liable Thereto" that:

> *In an agricultural country like Bengal the failure of the crops must always cause considerable distress, the degree of which varies with the nature and extent of the failure, the material condition of the people and their character, and lastly the accessibility or otherwise of the tract affected. The great cause of deficient harvests is insufficient or badly distributed rainfall. Sometimes much damage is done by floods, and sometimes, though more rarely, by blights or locusts; but in such cases the area affected is generally limited.*

> *The crop which is most sensitive to a short or badly distributed rainfall is the winter rice, which requires copious showers in May and a punctual commencement of the monsoon, but it is especially dependent on the continuance of the monsoon through September and the early days of October; it is this crop which is most liable to failure in adverse conditions. It follows that, if the rain is uncertain, the tracts most liable to famine are those in which the winter rice is the staple crop; but there, a serious failure of the winter rains is unknown and the subsoil water level is so high that, in years when the rainfall is moderately efficient, the ground retains sufficient moisture to prevent anything approaching a total loss of the crops. The whole of Dacca and Chittagong Divisions are therefore excluded from the list of tracts liable to famine. Here the only danger of disaster arises from cyclonic storm waves which at intervals burst over the country and in their wide train spread ruin and desolation. In other parts of Bengal proper, where also the winter rice is as a rule the principal crop, the immunity from famine is less complete; but the rainfall is usually ample, and the areas liable to famine are less extensive than in the other subprovinces. From time to time the submontane tracts have been swept by disastrous floods; and, when the embankments on the left of the Bhagirathi give way, floods occasionally break across Murshidabad and Nadia Districts* (Imperial Gazetteer of India, 1907).

By 1913 these ideas had been incorporated in the standing orders of the Bengal Famine Code[7] (Government of Bengal, 1913) See Figure 3i).

For want of any updating or replacement, this document remains the statute for famine contingency planning in Bangladesh today. The Planning Commission and the Ministry of Relief and Rehabilitation recognized the need for disaster

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[7]The Famine Codes were compiled for the provinces of British India to outline detailed administrative procedures, e.g., famine declaration, relief works organization, etc., for implementing contingency plans in the event of famine.

preparedness planning if development is to progress unhindered (Planning Commission, B. D. G., 1976). They also realized that there are certain areas which persistently have to request food relief and rehabilitation aid as a result of natural calamities (Ahsan, 1976). The ability to anticipate areas of need and preparedness for the timely "targetting" of appropriate relief inputs to those areas so that the catastrophe stimulates rather than impedes development is as yet unrealized. Although there is evidence of change, there is still a strong tendency for relief to be allocated only as a corrective rather than also as a preventive or development measure (Dodge and Wiebe, 1976).

This report demonstrates a method which makes possible the mapping of areas persistently liable to famine in Bangladesh. By enhancing the ability to anticipate famines it improves disaster preparedness. It thus makes possible the drafting of long term preventive plans which are meshed with the regional famine vulnerability characteristics before potential famines occur where the risk is greatest. The method builds upon the six principal points which the Bengal Famine Code (Figure 3i) advises should be given attention when compiling maps of tracts liable to famine, viz.:

1. *The previous history of the tract in regard to its having been visited by famines or not.*

2. *The density and economic condition of the people.*

BENGAL FAMINE CODE

CHAPTER 1.

STANDING PREPARATIONS.

1.—*System of Intelligence*

2.—*Programmes and Estimates.*

6. (1) Statements of areas liable to famine, and programmes of relief works, shall be periodically submitted to Government.

Statements of areas liable to famine, and programmes of relief works, to be periodically submitted to Government.

(2) District Officers shall submit to the Commissioner of the Division, on or before the 1st April of each year, statements in Form A—II, showing the areas in their respective districts which are considered liable to famine and the number of persons likely to require relief in the event of serious famine. These statements shall be accompanied by maps,† showing the areas liable to famine (tracts more liable being exhibited in shades of dark blue and those less liable in shades of light blue). The district statements and maps need not be submitted by the Commissioner to the Local Government, unless they are especially called for.

In considering the liability of a tract to famine, the following are some of the principal points which require attention:—

(a) The previous history of the tract in regard to its having been visited by famines or not.

(b) The density and economic condition of the population.

(c) The nature of the soil and the general capability of the tract to maintain its population.

(d) How far cultivation depends on rainfall, and whether the normal rainfall is regular or otherwise.

(e) How far the tract is irrigated by rivers, canals, wells, &c.

(f) The accessibility of the tract as regards importation of food-grains.

Estimates of the number of persons likely to require employment on relief works and gratuitous relief should be made with reference (a) to the experience of previous famines and (b) to the general condition of the various sections of the population.

In revising the statements year by year, due regard should be had to the increased protection, if any, afforded during the past year by new irrigation works and improved communications, or otherwise.

(3) It is impossible, under the urgent stress of actually present famine, either to select those works upon which money can be most usefully spent, or to ensure that those works which are selected are carried out upon the most economical and efficient plan. It is absolutely necessary, therefore, not only in order that money may not be wasted, but also that advantages are not lost which more careful preparation might have secured to the country, that projects should be prepared and sanctioned in advance which will be sufficient for all practical purposes.

† After a map has once been prepared, the preparation of a fresh one is, unnecessary, unless there has been some change in the areas liable to famine.

Best Available Document

3. *The nature of the soil and the general capability of the tract to maintain its population.*

4. *How far cultivation depends on rainfall, and whether the normal rainfall is regular or otherwise.*

5. *How far the tract is irrigated by rivers, canals, wells, etc.*

6. *The accessibility of the tract as regards the importation of foodgrains.*

Few such maps of areas liable to famine were ever compiled.[8] The poor response has probably been mostly because of administrative difficulties, but the problems of compiling such a map from so nebulous and non-operational a series of indicators probably encouraged the inaction. The six principal points suggest rather than specify actual areas liable to famine. They avoid grappling with the idea of total liability and the relative importance of each of the six points. In considering projects to provide relief, the famine code made no specific attempt to tailor such relief measures towards lessening the long term liability of the particular areas affected. These limitations in mapping the areas liable to famine are the problems this report tries to overcome.

[8]Examination of the Famine Proceedings reveals that these maps were seldom submitted (Sims, 1977). Careful archival investigation at the India Office Library and Records, London and the West Bengal State Archives, Calcutta have traced only one District report (Dinajpur, 1899) which was accompanied by such a map. This map is no longer available in the West Bengal State Archives (Mukherjee, 1977).

SECTION 4.

Why is it necessary to use the Delbecq-Delphi process to map areas liable to famine in Bangladesh?.

THE LACK OF COMPLETE DATA

"On the threshold of my inquiry, I was confronted with what has been held to be a great want to an administrator in Bengal, the want of agricultural statistics."

A. P. MacDonnell, (1876). Report on the Food Grain Supply and Statistical Review of the Relief Operations in the Distressed Areas of Behar and Bengal during the Famine of 1873-74.

"We always exaggerate the intensity of famine conditions at least twofold, in order to get support, and to get it quickly."

Member of the Salvation Army Delegation, Dacca, Bangladesh. 1976.

Statistical Data in British India:

Compared with the geographic data banks (e.g. Hagerstrand and Kuklinski, 1971) of developed countries, Bangladesh, like other areas of the developing world (e.g. Baker, 1977), but unlike most of the rest of the Indian sub-continent, has a poorly developed statistical information system. Historically, British India developed a more complete statistical system than other colonized areas of the developing world, e.g. the Dutch Indies (Furnivall, 1948) or French Africa (Hailey, 1938; Caldwell, 1975). The relatively settled agricultural condition of India's people, compared with the situation of the nomadic Taureg in West Africa or that of the transhumant Muri pastoralists of South West Ethiopia, has greatly facilitated the gathering of social and agricultural

statistics. Also the relatively greater education of the British colonial administrators compared with the predominantly lower middle class French and Dutch foreign service officers, aided the replication of the home government's statistical system in British India. For several reasons, however, the system was poorly applied in Bengal.

In the late eighteenth century, the East India Company first carried out surveys to acquire social, economic and environmental information. Those early surveys, according to Davis (1951), were "fragmentary, unsystematic and lacking in uniformity." More information became available after 1869 when the Statistical Survey of India was carried out in all fifteen of the British provinces. The situation further improved when the results of the survey were condensed into the volumes of the Imperial Gazetteer of India and published in 1881. Then in 1885 and 1901 similar gazetteers were published which also included serial statistics such as the results of the 1881 Census of India and the 1861 Statistical Abstract.

Davis, (1951) has argued that these statistics, although inaccurate and lacking much of the elemental ancillary data, are sufficient to estimate trends, but not to document individual events, although such major events as those associated with reform or scandal were detailed by post facto commissions, e.g. The Royal Commission on Agriculture in India, (1927) or the Commission on Famine in Bengal and Orissa, (1866)

Even today the relative difficulties of measuring events in the subcontinent are epitomized by the lack of an effective registration system for vital information on the population of the rural areas.

Statistical Data on Bengal:

In comparison with other areas of India, Bengal has had a poor statistical system throughout its history. In pre-Moghul times (pre 1201) the Aryan administration did not extend as far east as Bengal, where the local Buddhist kingdoms had an "immensely inferior administrative system". (Floud, 1940). This may have been because the land was individually owned by each cultivator in Bengal. There was no community land ownership. Thus there was less need to maintain community records of the land owned by each community member.

Later, in Moghul times, the Emperor Akbar's detailed revenue assessments implemented throughout India by Raja Todar Mal, the revenue minister, were not applied to Bengal because it had not yet been annexed. The Ain-i-Akbari (Akbar's chronicles) (1877, 1927) suggested that after the annexation of Bengal, Akbar merely retained the existing "nasaq" or lump revenue assessment system in Bengal. In contrast with the other regions of Akbar's India, no statistical figures were collected to show actual land areas for Orissa, Bihar or Bengal (Floud, 1940).

In British times (1757-1947), Lord Cornwallis' permanent revenue settlement (1793), according to which rents

were fixed in perpetuity, actually exacerbated Bengal's inferior statistical system in a "Catch-22" situation. Since there were neither maps nor reliable records of the areas of the holdings of individual raiyats (cultivators) in Bengal, (Floud, 1940) Cornwallis taxed the zamindars (landlords) in Bengal. This zamindari system contrasted with the raiyatwari (cultivator brokerage) and mahalwari (community brokerage) systems in other parts of India. In turn, this meant that the government officers, being in close contact only with the landlords, were deprived of first-hand knowledge of rural conditions in Bengal, and thus were unable to collect accurate statistics to reflect them.

Statistical Data in Bangladesh.

At the end of the Pakistan regime (1947-1971), the country "lacked statistical information on perhaps one-half of the economy." (Rabbani, 1968). Attempts to improve the statistical system by an advisory service from the U.S. Department of Commerce, Bureau of Census, under an A.I.D. agreement, were suspended in 1969 because of the decreased development funds allocated to the eastern wing of Pakistan and the "low priority accorded statistical services by the controlling officials of the East Pakistan Government". (Elkinton, 1976). The International Bank for Rural Development (1974) summarized the statistical situation at the beginning of the Bangladesh period, thus:

> *(a) The size of the total statistical output is quite large for a country at that stage of development.*

(b) The relevance to needs of the statistics being turned out is good, with one major exception. Relatively little attention and effort is paid to the production of national accounts estimates...

(c) The quality of statistics is mostly only fair, and in some fields poor...

(d) The timeliness of statistics is poor with delays of as much as two to three years for many series and even more in the case of printed reports....

(e) The impartiality of statistics is weak, with many figures reported being adjusted, usually by small amounts, on the insistence of other agencies. However, given the poor quality of many statistics, it is often difficult to judge whether statistics were closer to or further away from the truth after adjustment."

I.B.R.D., 1974. p. i.

These limitations in the national statistics are magnified at lower levels of analysis. Comparatively few statistical series are available at an administrative level below that of the District. Notable exceptions are the National Census which records elementary data, i.e., total population by sex, number of literates, number of households, for each of the country's 4266 Unions, (Bangladesh Bureau of Statistics, 1976) and the Bangladesh Soil Survey, which has carefully mapped and inventoried soil environment conditions for each soil association throughout the country (U.N.D.P. 1971).

Agricultural statistics still remain amongst the nation's most serious data deficiencies. Rice production accounts for one-third of the gross domestic product, but it is still "guestimated" by the combination of subjective assessments based on a 1944-45 bench mark "norm" and objective crop estimates from sample harvest areas (Elkinton, 1976). Over-

exuberant plans for satellite crop assessments (Bangladesh Atomic Energy Commission, 1974), still remain unrealized. The state of agricultural statistics is perhaps best understood in terms of an official remark made by an experienced foreign agricultural advisor: "They would be better off if they didn't have the false security of having them."

Statistics on specific events, or interruptions in production figures, even when the event is less emotional than famine (see below), are at least as incomplete as those in the standard statistical series, if not more. Some of the results of incomplete reporting of events, in this case floods, are revealed in Table 4i, (I.B.R.D. 1972)[1]. In some cases data are non-existent. They may never have been collected, either intentionally or unintentionally. They may have been collected and then lost through negligence, perhaps even to termites. The data may have been collected and then destroyed through civil disturbance or natural calamity. They may perhaps have been officially destroyed as were many "Class C" government documents after independence in 1971. Taccavi loan payments distributed as a form of disaster recovery grant since Moghul times would have provided a basis for mapping disaster prone areas, but because they were only "Class C" documents they too were destroyed in 1971.

---

[1]The statistics available to I.B.R.D. are not necessarily available to a researcher in Bangladesh, although the opposite also holds.

Estimates of Flood Damage

(Millions of Takas - Current Prices)

1962 estimates of Aman Crop damage by District:

District	W.A.P.D.A.	Agricultural Directorate
Mymensingh	55.52	76.808
Sylhet	36.75	88.666
Rangpur	3.25	25.525
Bogra	19.58	43.419
Pabna	63.69	43.283
Dacca	60.42	47.797
Rajshahi	4.89	--
Faridpur	10.61	65.729
Total	254.71	391.227

1962-70 Estimates of losses to Crops and Property:

Year	Relief and Rehabilitation Dept.	Agricultural Directorate
1962	554	707
1963	?	60
1964	183	158
1965	?	36
1966	577	480
1967	?	84
1968	1164	1186
1969	82	307
1970	1380	?

I.B.R.D. 1972

Table 4i

Data on events may also be unreliable, either because of actual errors, or because of bias in reporting due to pressures from either the victims of the events, or from those who must deal with the event. Furthermore, information for some events may not be accessible, either because it cannot be located because there is a (perhaps momentary) human problem in securing the release of the data, or because the data is classified. The last problem increases if the information needed is for a localized situation, thus requiring detailed information at a large scale, e.g., air photographs. (As regional problems normally require only the less-detailed satellite images, the data is easier to acquire.) Non-availability of information also increases if the problem being studied encroaches upon a sensitive topic, or if it involves sensitive geographical areas such as those near international boundaries.

Data may be available only for certain periods of time. Some statistics, e.g., the census, are only published every ten years. Others are not available for periods of disruption, e.g., a civil war, either because of a failure to record during the disruption or an unwillingness to release data for that period at the time. Some may be made available either deliberately or by default, only after the time when they are crucially needed.

Finally, some statistics on events are available only for certain areas. Particular districts or units may not

have sent in reports. The data may have been collected only for a certain project in a certain area, eg., tube-well sinking in parts of North Bengal; and even then, limited data may be available only at the aggregate level, such as the district.

Data in Famine Conditions:

Earlier, some of the symptoms and causes of famines were reviewed. These characteristics make the gathering of complete data in famine situations particularly difficult.

As the famine evolves, there is a gradual erosion of the social and administrative framework, including a deterioration in the national statistical system prior to the actual outbreak of crisis conditions. The resulting backlog of record keeping and collation inexorably entices civil servants to fudge information. They may merely replicate past records so that any change is not recorded. Later, when it is acknowledged that a change has occurred, they may overcompensate to ensure that the change is visible in the record to their superiors. Those officials involved in record keeping may be temporarily involved in, or assigned to, other ad hoc duties, (e.g., a national small-pox search), as social and economic conditions deteriorate. Lower level record-keeping officials, if not devoting their energies to ensuring the survival of their family and relatives, may have little incentive to complete records and forms, particularly if

the central administration has failed to pay their wages during the same period.

The poorly developed areas, where the prevalence of famines is greatest and the effects most severe, are often remote from centers of communication as well. They are thus the areas most likely to be cut off from the information collation and evaluation center. They are also the areas where past calamities may have already disrupted the statistical system.

Famine is an abnormal event. Different phenomena occur which require new statistical systems if they are to be measured. During normal times, however, it is not feasible to maintain a continuous record of such phenomena. Thus, begging is not perceived as a problem in normal times, and it little behooves a developing country with scarce resources, to set up a continuous surveillance system to monitor begging patterns. Abnormal data sources have to be tapped for information during a crisis. The records of the Anjuman Mufidul Islam, the charitable Muslim burial society, were utilized to examine street death trends in Dacca, but neither those who designed the records, nor those who kept them as suitable meals for the termites that had eaten through the protein rich ink of earlier records, could anticipate the importance of such data for documenting the incidence of famine.

Crisis, by nature, demands action, not words. It may, in fact, even spurn thought. Careful record keeping is

synonymous with words. Masefield (1963) has pointed out the scarcity of documented relief studies. Death and starvation engender relief action rather than experimentation from the humanitarian, whether he is a Bengali or a foreign national. The classical "control experiment" of the scientist is unethical in such situations. It is immoral to give a "placebo" for food relief to a control group in a famine area. Without this control on results, the interpretation of data gathered in a famine situation may be ambiguous.

Disruption normally occurs prior to the outbreak of a famine. There is often an unusual displacement of people from the rural areas. Before a famine, large scale river erosion or flooding may destroy some homes and force other households to move. Thus, households which might be the unit for measuring the intensity of famine symptoms, are no longer there. Existing maps, and even recent aerial photographic coverage, become outdated and occasionally useless, as an aid to data collection. Efforts to raise purchasing power by the sales of possessions may include the transfer of a door section,which may have on it the malaria eradication number, to an owner several villages distant. The loss of the household malaria eradication number effectively means the loss of that household from any survey of households for purposes of monitoring the effects of famine, (e.g., Mahalanobis, 1946).

During famines, the groups with the largest "non-response" in surveys may be the most affected group: the poor, the dead, and those who have migrated. Traditional famine surveys, like those of Mahalanobis, may have omitted many of the poor whose houses were not included on the union parishad (local council) tax roll, or who, indeed, may have had no household. The famine victims may have left their homes. As destitutes, they may have followed daily begging patterns which brought the household together around a cooking fire, not at their former household location, but near a town bazaar, often only after nine o'clock at night.

The emotion associated with famine exaggerates any mistakes. The opposing political party in a crisis may exploit statistics that condemn the ruling party (e.g., Hariharma, 1976). Jodha (1975) has described how the involvement of politicians in Rajasthan's famine-reporting system has made reports from local officials irrelevant, reducing their function to that of "furnishing statistics for decisions already taken". The Bengal Famine Code (Government of Bengal, 1913) did describe a famine warning and monitoring system whereby local government officials were responsible for regularly reporting famine symptoms to the provincial capital. However, even if such a system had been maintained, it is doubtful whether officials could have contributed accurate information to such a system while under the strong political pressure existing in some areas in late 1974.

As an example of such difficulty, there were three assassinations of local government officials in Kurigram subdivision, which were reputed to have been at the behest of the local member of parliament.

The local authorities may wish to exaggerate figures on the degree of hardship in their area in order to secure increased aid from the central government. The latter may, however, play down the magnitude of a local problem until such time as they are pressed into declaring a crisis, or until evidence appears to substantiate a request for international aid. A central government policy may indirectly bias statistics emanating from a famine area. Thus Alan Berg, in an article with the optimistic title, "Famine Contained", relating to the Bihar experience in 1966-67, inserts a small footnote which states:

> *"Local officials were personally held responsible for starvations in their jurisdictions and thus, any report from them of a death, would reflect their own inability to prevent it. As a result, deaths were sometimes attributed to other causes."*
>
> (Berg, 1971)

Once the central government has declared a famine, however, the statistics detailing the distress may be exaggerated "in order to get support and get it quickly", (Member of Salvation Army Delegation, Dacca, 1976). Whether exaggerated or underestimated, the statistics provided in times of famine can rarely be trusted.

Relief statistics which are gathered in times of famine are often gathered to justify or deny the need for distribution

of relief, and other attempts at famine amelioration.

Because relief strategies are short-term, they seldom contain anti-corruption measures. Thus, they are open to exploitation. Jodha (1975) has quantified the differences between recorded figures and actual figures (Table 4ii) for a relief operation in Rajasthan. Even a figure traditionally used in the declaration of famine,[1] the record of the number of days that relief was said to have operated, was exaggerated from an actual figure of 73 to a recorded figure of 95. Table 4ii also shows that there was a threefold exaggeration of the "weekly expenses for water and other necessities," i.e., items that are more difficult to monitor than "days that relief operated." The difficulties of any individual official attempting to correct such discrepancies was highlighted in a vignette about a revenue collector in Barmer, who visited relief works in the district of western Rajasthan in India in 1970:

> *"He found that in most areas the number of workers as per the muster-roll exceeded the total population of the areas by 50 to 70 percent. Disgusted by this, he ordered complete closure of all relief works in certain tehsils and initiated the supply of relief (part loan, part dole) on the basis of ration cards. He found this method of relief very economical and effective. He was transferred to a district of South Eastern Rajasthan where droughts are very uncommon."*
>
> (Jodha, 1975)

Table 3ii

DIFFERENCES BETWEEN THE RECORD AND REALITY OF A RELIEF OPERATION

(Based on Details of 113 Labourers at one location in Rajasthan, India)

Item	As Recorded	In Practice
Number of days relief work operated	95	73
Average number of workers employed per day (for 73 days)	935	462
Road Construction per worker per day (feet)	1.2	2.5
Total cash wage payment per week (Rupees)	4907	2569
Total grain (wage) payment per week (quintiles)	36.7	16.2
Expenses on water and other facilities per week (Rupees)	115	35
Average earning (cash + kind) per worker per month (Rupees)	45.6	37.3

(After Jodha, 1975).

A final characteristic of a famine situation which may affect the completeness of the data is the influx of foreign nationals. These outsiders from information-conscious countries may seek to improve or even circumvent the local information system, but because of their naiveté in the novel cultural situation, and their reliance on indigenous sources of information, they may not only be provided with spurious information, but they may also misinterpret the data that is provided (Ratcliff, 1977).

Neither should the cloak of sanctity associated with relief activities hide the opportunitites for deliberately biased information associated with foreign intervention programs. The activities of the foreign nations involved in the crisis situation are far from incorruptible as epitomized by the Stonehouse case in Bangladesh.

As Cuny et al have pointed out, (Davis 1977), the outside organizations in a disaster situation generally have no accountability to the famine victims and little, if any, accountability to anyone. They do, however, have self interest which may be buttressed by "bending" the data. The United Nations organizations need to "show how valuable they are to ensure their future growth and funding" (Davis, 1977). Overseas governments often have to "fulfill their foreign policy aims by rewarding faithful allies, and at the same time provide opportunities for businesses at home." Overseas charities, too, have to "show their supporters and

rival agencies how valuable they are to ensure their future growth and funding", and the "foreign experts often have a need to impress rivals with their superior knowledge or skills" (Davis, 1977).

With famine characteristics "blurring" the collection of statistics, it is not surprising that the record of famines is incomplete. A glance at the historical record of famines in the various gazetteers and statistical accounts reveals the lack of consistency among records. The records were certainly published in different periods, ranging from 1874-1976, but it is nevertheless remarkable that there are only two instances where all five sources agree that a famine or scarcity occurred in that district, in that year. Even this apparent consistency may only result from occasionally consistent plagiarism from the first record to the subsequent records.

In the absence of a complete historical record of famines in Bangladesh, it was surprising to find that 75 percent of 135 decision makers associated with famine problems in Bangladesh (see Figure 5 iii), replied in the affirmative to the interview question "Do you think it is possible to predict <u>when</u> local famines will occur in Bangladesh?" (See Appendices B, C, D). Indeed, 96 percent of one group of decision makers, all Bengali retired government officers, from the total of 135, agreed that it was possible to predict famine. However, closer inspection of the responses

revealed that less than 1 percent of the 101 initially responding in the affirmative, did so without qualification. The other 99 percent, all qualified their affirmative reply by indicating that prediction was only possible after a disaster or series of disasters had occurred. The majority also added the qualification that additional monitoring of information on purchasing capacity, rice prices, storage levels, migration patterns, and local reports would have to be carried out if the famine were to be predicted. Even such a short term prediction is thus predicated upon the organization of an improved nationwide data base.

Any attempt to map areas liable to famine in Bangladesh is thus faced with a lack of complete data: the historical record of statistics, although better than many areas of the developing world, is nevertheless incomplete because of the particular revenue system used in Bengal, and the present day statistical system is mediocre because of the recent political, administrative, and environmental disruptions. Data relating to famines, both historically and at present, are particularly prone to bias and incompleteness. Because of the lack of complete data, it is not yet possible to forecast famines in Bangladesh. This dissertation argues, however, that rather than waiting for several decades for the availability of data like those in the developed world, it is possible to use experienced judgments to carefully select sufficient information from the presently available data to map the areas liable to famine in Bangladesh.

SECTION 5.

What is the "Delbecq-Delphi Process" and how was it used to compile a map of areas liable to famine in Bangladesh?

THE DELBECQ-DELPHI PROCESS

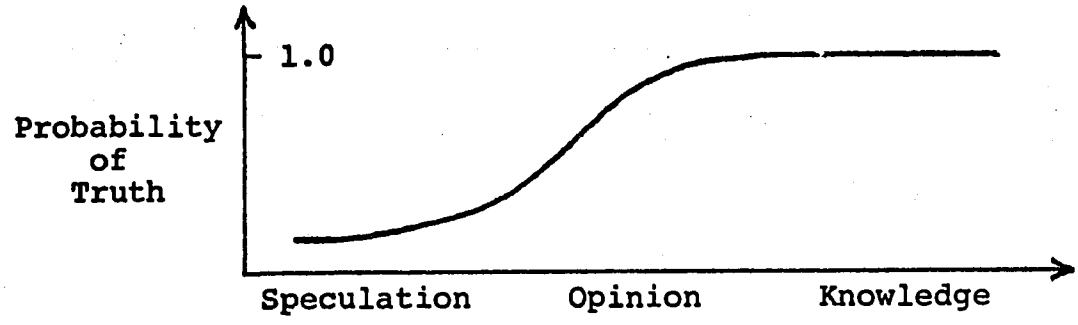
*"But we cannot wait under the present conditions of the world
Until we get all the exact and detailed information."*

Lord Boyd Orr
Quebec Speech, 1945

"The proper place for the scientist-once in a while at least- is in the midst of the unknown, the chaotic, the dimly seen, the unmanageable, the mysterious, the not yet well phrased. This is where a problem oriented science would have him be as often as necessary. And this is just where he is discouraged from going by a means stressing approach to science."

A.H. Maslow, 1946

In Bangladesh there is a dearth of data on famine problems, but there is a group of knowledgeable people in the country who have experienced repeated famines and otner environmental disruptions. Because there were virtually no objective data available on either the areal distribution of famines or their causes in Bangladesh , I decided to use an intuitive method. As a foreign researcher new to the country and to the problem, I assumed that the judgment and insight of those with experience with the problem of famine in Bangladesh could provide me with opinions that would be more likely to be correct than my own naive speculation.



(Daltrey, N. C., 1969)

Figure 5-1.

I therefore proposed to determine the consensus of knowledgeable opinion by integrating two social science techniques, the Delbecq method and the Delphi method, into a technique that I am calling the 'Delbecq-Delphi Process' (Figure 5iii) I assumed that this integration of these group techniques would best allow me to reach a consensus of views while minimizing the potential effects of my own lack of training in group psychology.

Both the Delbecq and Delphi methods involve attempts to elicit a consensus judgment from a nominal group, i.e., a group where verbal exchange and argument are excluded. The Delbecq method or process has been principally used to derive a list of items pertinent to a particular problem and then to evaluate each item against a rank or ordinal scale. The Delphi method, on the other hand, has been used to evaluate a list of items against an interval scale of measurement. Derived from planning programs involving

citizen participation, Delbecq has only recently been used in social sciences. It remains untested. Delphi is an older method which has been used by social scientists in laboratory situations, but it too remains untested in a field situation. Both techniques are designed to minimize bias in committee decision making.

The Delbecq Technique

The Delbecq technique, initially called the Nominal Group Technique was developed by Andre L. Delbecq and Andrew H. Van de Ven in 1968. As described in the literature (Delbecq and Van de Ven, 1971 and 1972; Delbecq, Van de Ven, and Gustafson, 1975), the technique has four stages:

1. Members of the group silently write down their ideas.
2. The essence of each individual's ideas is presented to the group as a whole.
3. Group members discuss each recorded idea for clarification and evaluation.
4. Individual group members vote silently on priority ideas, with the group decision being mathematically derived through rank ordering or rating.

(Delbecq et al., 1975).

Although stages 1, 2 and 3 are adapted and integrated into "The Delbecq-Delphi Process" in this research design, I have termed the rank ordering strategy of stage 4 as the "Delbecq Session".

This rank ordering strategy requires that the members of the nominal group, upon request from a group mediator or non-voting chairman, rank a specified number of items from a given list by writing a value (N), where N corresponds to the total number of items, on a card next to the item judged to be the most important. The value (N-1) is then written on another card against the item judged to be the second most important and so on until all the items have been given values. Then the total 'judgment scores' for each item are tallied for the entire group, and the items are ranked by total scores. That is, the item with the highest aggregate score is ranked first, the item with the next highest aggregate score is ranked second, and so on.

To my knowledge, this simple technique has never before been used in either a geographical study or in any study of a problem in the developing world.

The Delphi Technique

The Delphi Technique's first documented use was to improve the prediction of winners at horse races in 1948 (see Quade, 1967). The technique received the seal of approval in social science, however, when Dalkey and Helmer used it in 1953 to evaluate the potential "effects of strategic bombing on individual targets in the U.S." (Dalkey and Helmer, 1963). During the 1950's and 60's, studies by other proponents of Delphi at RAND corporation provided rather indirect support for the technique's predictive

powers. For example, student groups in several instances were asked to "guestimate" facts verifiable from almanac sources, and their answers proved generally accurate (Brown, Cochrane, and Dalkey, 1969; see also Helmer and Rescher, 1959 However, none of these studies dealt with "real-world" problems.

The Delphi technique has evolved through this research to become a method of refining and quantifying group judgments on variables about which exact knowledge is not available. There have been three basic features of Delphi:

1. Anonymous Response by each individual in the group, e.g., by questionnaire, to minimize bias from dominant members.
2. Iteration and Controlled Feedback allowing each individual in a group to re-evaluate his or her individual judgment in a second round after he or she knows the group's initial consensus judgment.
3. Statistical Definition of the Group Response by use of the median response to ensure that the judgment of each individual member of the group is represented in the group response and yet to minimize the effects of a few extreme judgments. Thus the need for group uniformity is circumvented.

The rationale for the technique, based on the adage that two (or n) heads are better than one, is illustrated in Figure 5ii which suggests that in a second round of evaluations the nominal group's average response on any item

GRAPHIC REPRESENTATION OF THE DELPHI RATIONALE

Round 1:

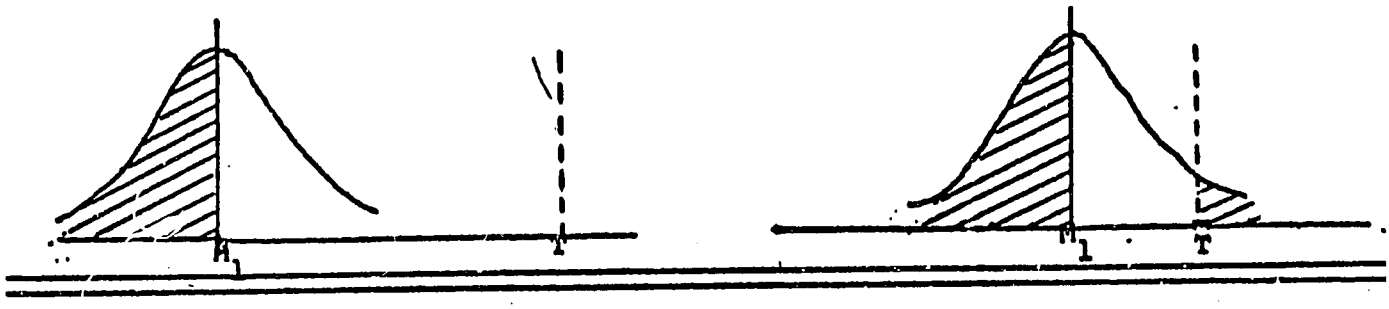
- Wide deviations in the responses from individual members of the group.
- Deviations depend upon group size and group expertise.

WORST GROUP JUDGMENT

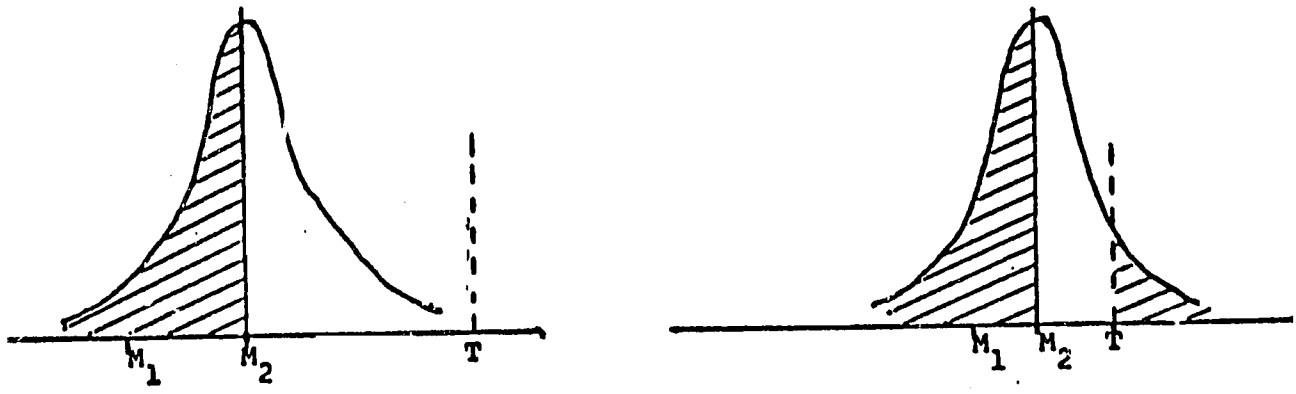
The median or average response of the group (M) is nearer the most probably true value (T) than 50% of the individual responses.

NORMAL GROUP JUDGMENT

The median or average response of the group (M) is nearer the most likely value (T) than more than 50% of the individual responses.



Round 2:



- 'Swingers' - those unsure of their judgment who are far from the round 1 median, reassess their judgment to a value nearer the group response.
- 'Hold-outs' - those sure of the most likely value or those already near the round 1 median show less inclination to reassess their judgment.
- Thus deviation narrows and the median approaches the most probably true value.

Figure 5ii

will converge towards the median response of the group on the first round. Also the average response is likely to move towards the most plausible value, because respondents who were unsure in their initial response will change more than others in the second round. There is a counter argument that it would not be the knowledgeable group members, but rather those with stubborn or dogmatic personalities who would have the a propensity not to change their weighting in the second round, but this has been partly dispelled by the Mulgrave and Ducanis (1975) study, which compared Delphi participant's ratings on Rokeach's Dogmatism Scale (Rokeach, 1960) with their willingness to change their views between rounds one and two. Those with "dogmatic" personalities were found to be more likely to change, perhaps because in the absence of any clearly defined authority to follow, they saw the first round median as the "authority".

By the 1970's over 1,000 Delphi studies had been completed (Linstone and Turoff, 1975). Although the technique "had catapulted into international prominence" (Sackman, 1974), with studies assuming its effectiveness appearing in the United States, United Kingdom, Sweden, U.S.S.R. and Japan, literature critical to Delphi was sparse by comparison. Those attacks on the technique that have appeared have cited (1) the limitations of other forecasting techniques in dealing with surprise events, inadequate data and unpredictable interactions (Quinn, 1971); (2) the unproven assumption that "experts" are more knowledgeable

than the general population (Bedford, 1972); (3) the loss of data because of the lack of interaction by participants in Delphi sessions, (Milkovitch, Annoni, and Mahoney, 1972); (4) the inadequate attention paid to the psychological values of the participants (Weaver, 1970); (5) the failure to capitalize on the extensive mathematical literature on subjective probability theory (Morris, 1971); and (6) the uncritical acceptance of the median value as the best estimate of the expert opinion without removing possible confounding factors (Derian and Morize, 1973).

The most thoroughly disparaging review of Delphi was that by Sackman (1974) who evaluated the technique against the American Psychological Association's standards for social experimentation and opinion questionnaires. He concluded that conventional Delphi "neglects virtually every area of professional standards for questionnaire design, administration, application and validation."

Sackman particularly criticized most Delphi studies because of:

1. their "lack of adequate formalization and definition of the target domain";
2. the lack of precision in "operationally defining the characteristics of the panelist sample", their relevant professional experience qualifications and the directions under which they made their judgments";

3. the lack of "a systematic relationship between the selected panelist sample and the objectively defined population";
4. the lack of documentation of the "drop-out group" from the sample selected;
5. the lack of careful documentation of how the comprehensive items are elicited from panelists;
6. the "lack of documented procedures for pruning down the initial list of items to the final set used for the study";
7. the "lack of careful definition of the items evaluated";
8. the lack of "statistical documentation of variance in responses;
9. the lack of documentation of the extent of validity between independent judgments and dependent judgments; and
10. the lack of careful documentation of the "accountability for the interpretation of the results".

Reviews by proponents of Delphi, (e.g., Pill, 1971; Welty, 1972 and Linstone and Turroff, 1975), have responded to these criticisms by arguing that "The Delphi technique should be used at high levels of uncertainty, and that one must accept the difficulty of gauging its usefulness." It has elsewhere been suggested that "its eventual usefulness will be judged by its performance, rather than by any abstract of its worth." (Pill, 1971).

Despite these criticisms, Delphi has been applied to a number of uses in different fields, including management, (e.g., Steiner, 1969), futures studies, (e.g., Bedford, 1972), business, (e.g., Milkovich et al., 1972), clinical medicine, (Inglefinger, 1974), and food policy planning (Agarwal et al., 1976). In addition, its techniques are also slowly being adapted by geographers. Paul and Landini, (1975) undertook a Delphi study to "determine what were the most important land use data items to be interpreted from remotely sensed imagery for the Santa Cruz mountains," but the first explicit use of Delphi by a geographer was the study in which Smil (1975) investigated "Future Developments in Energy Resources and their Environmental Impacts." Later, one of Smil's students applied the techniques to forecasting urban growth in Winnipeg (Thraves, 1976). The effectiveness of Delphi in these geographic studies was neither confirmed nor in any other way evaluated, however. Moreover, the studies included minimal descriptions of the methodology. Both studies appear to have credulously accepted Delphi with no reservations. This same blind faith is apparently being transferred to research on environmental perception. Geographers editing the report on the Man and Biosphere Project 13: Perception of Environmental Quality, have without restraint, encouraged the use of the Delphi technique in policy formulation (Burton, 1973). Thus the general lack of rigor discussed by Sackman (see above) is being carried over into Delphi studies in geography.

The focus of this report is to provide a solution to the real problem of delimiting areas liable to famine in Bangladesh. It is not primarily designed as a test of a methodology. However, one of the essential by-products of the research reported here is an evaluation of the results of the subjective Delphi ratings by comparing them with real-world phenomena. Moreover, to insure that the technique itself is evaluated, rather than merely the implementation of the technique, I have attempted to compensate for Sackman's criticisms (see above) by using and documenting a significantly more rigorous methodology than those used in the earlier applications of Delphi to geography. Specifically, I have countered Sackman's criticisms with the following steps:

1. Careful definition of the area of inquiry.
2. Careful documentation of the characteristics of panelists.
3. Careful selection of panelists on the basis of professional training and scaled experience levels, and documentation of the selection procedures used.
4. Careful documentation of the 'drop out' group in this study.
5. Careful documentation of the elicitation of comprehensive items from the panelists.
6. Careful documentation of the selection of specific items for evaluation from among the elicited list of items.

7. Careful definition of the items evaluated.
8. Careful documentation of variation of scores between groups.
9. Careful documentation of the extent of agreement between independent judgments (1st round) and dependent judgments (2nd round).
10. Careful documentation of the limitations of the test scores.

The Delbecq-Delphi Process

Introduction

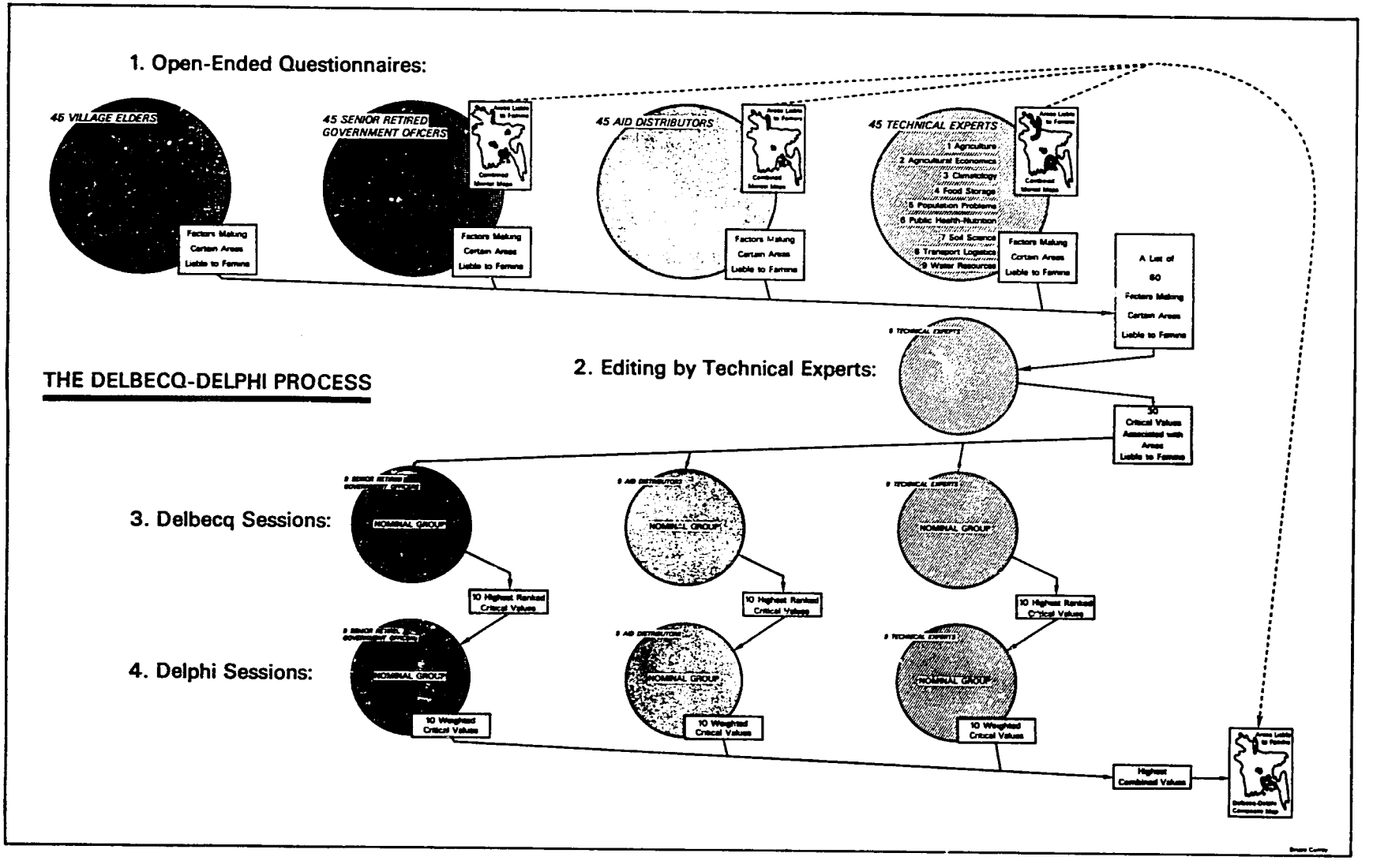
The Delbecq-Delphi Process used in this study (Figure 5iii) consisted of four stages through which it was possible to elicit, refine, evaluate and weight the importance of factors that might reasonably correlate with the areas liable to famine in Bangladesh.

Stage 1 consisted of administering an open-ended questionnaire to four groups, each of 45 people, who are or have been involved with famine problems of Bangladesh: village elders, senior government officers, aid distributors, and technical experts. These open-ended questionnaires (See Appendices) attempted to derive a profile of the training and experience of the respondents, elicit their definitions of famine, find out whether they thought famine prediction was possible, and determine whether they thought certain areas in Bangladesh were more liable to famine than other areas. If they thought there were areas more liable to fam

than others, they were asked to list the factors they considered led to this greater liability. Next, each respondent was asked to identify on a map those specific areas he or she believed to be especially susceptible to famine and to state for each such area the factors they associated with the famine liability. Finally, the respondents were asked to suggest possible preventive plans that either the villagers themselves or the government could implement in those areas.

Stage 2. The 60 factors elicited in Stage 1 were split into nine general areas of concern (e.g., agricultural concerns, economic concerns). Nine technical experts--one expert for each area of concern--were then contacted individually and asked to edit the factors subsumed under their areas of expertise. The editing consisted of two stages. First the experts eliminated from future consideration those factors for which reliable information on each area of Bangladesh was lacking. Next each expert determined for each remaining factor a 'critical value' such that if the critical value was exceeded in a geographical area the factor was likely to contribute to famine liability.

Stage 3. A list of the thirty remaining factors together with their critical values were then distributed to three separate groups of nine persons each: nine retired senior government officers, nine aid distributors, and the same nine technical experts who participated in Stage 2. Unfortunately, it was not logistically feasible to involve


1. Open-Ended Questionnaires:
45 VILLAGE ELDERS
45 SENIOR RETIRED GOVERNMENT OFICERS
45 AID DISTRIBUTORS
45 TECHNICAL EXPERTS
1 Agriculture
2 Agricultural Economics
3 Climatology
4 Food Storage
5 Population Problems
6 Public Health-Nutrition
7 Soil Science
8 Transport Logistics
9 Water Resources
Factors Making Certain Areas Liable to Famine
A List of 60 Factors Making Certain Areas Liable to Famine
THE DELBECQ-DELPHI PROCESS
2. Editing by Technical Experts:
30 Critical Values Associated with Areas Liable to Famine
3. Delbecq Sessions:
NOMINAL GROUP
10 Highest Ranked Critical Values
4. Delphi Sessions:
10 Weighted Critical Values
Highest Combined Values

the village elders in this stage of the process. The three groups were then invited to three nominal group meetings at separate times. In this Delbecq session they each ranked the five factors they thought were the most important in determining the areas liable to famine in Bangladesh.

Stage 4. After amalgamating their rankings a list of the ten most highly ranked factors together with their critical values were then evaluated in greater detail by the same groups of nine in a Delphi session. Each member of the group was asked to score on a card the list of ten factors on a scale 1-100, just as they might do in scoring an essay or examination. If a group member judged the areas liable to famine to be exactly equivalent to the areas for which the critical value of a given factor was exceeded, then that factor was assigned a value of 100. Factors judged to match less well with the areas liable to famine were assigned lower values. After each of the ten factors had been assigned a value, the mediator, in this case the researcher, selected the median value which had been previously selected by the nine panelists for each factor. The group were then given the median scores of the values they had assigned and were asked to weight the ten factors again. Some members changed their judgments while others remained the same on some or all of the factors. The median values assigned in this second round by each group were used as the group's weighting of the importance of the factors.

After standardizing these weightings for each group and then combining the weightings for all three groups, it was then possible to compile a composite map by amalgamating the areas defined by the critical values with their assigned weightings. The map thus derived was an areal index of famine liability, where higher numerical values indicated judgment of greater famine liability. This map was then compared with the combined individual mental maps of areas liable to famine that had been generated in Stage 1 of the Delbecq-Delphi Process (Figure 5iii).

Elaboration

As noted in the outline above, four groups of people involved in decision-making related to famine problems in Bangladesh were included in the initial open-ended questionnaire survey: village elders, retired senior government officers, aid distributors, and technical experts. The four groups were chosen because of their combined experience with a broad range of famine problems. Although the group of village elders were chosen to represent experience at a local scale, the other three groups were chosen because of their nationwide experience. The senior retired government officers had long experience in different areas of Bangladesh and had dealt with famine problems before. The aid distributors were the contemporary decision makers involved with relief and rehabilitation programs during and after the 1974-75 famine in Bangladesh. The technical experts were from those groups who presumably provide the background

information for contemporary decision making. Unfortunately the study omitted a fifth group, the bhumiheen krishak (landless labourers) who are most severely affected by famines. The method may therefore be viewed as "elitist". This is a failing, but it is also a realistic decision in that famines may reflect the inability of the bhumiheen krishak to make development decisions under the status quo. Also the bhumiheen krishak's knowledge of conditions at a national scale may be even more limited than that of the village elders.

The Village Elders (murrubbis). The group of Bengali-speaking village elders were selected from nine villages along an east-west line through the center of a reputedly famine-prone thana, Bhedarganj, in Madaripur subdivision of Faridpur District. For each of four villages on the adi (stable land) and five villages on the char (unstable riverine land), five murrubbis were nominated by the primary school master, who attested that the men nominated were relatively established and respected village elders rather than matbars, the members of power groups who have political ties to the urban centers. None of the murrubbis chosen claimed to be less than 30 years old, and the average age claimed was 53. Sisty seven percent had been born in their villages and all but three of the fifteen who were not, had lived within Bhedarganj Thana since before the great Bengal Cyclone of 1919. All the Murrubbis could recall being part of British India; 21% could recall the 1919 cyclone. Although 24 percent of them could

not read or write and seven percent were only educated through the teachings of the Quran, 29 percent had completed primary education, 31 percent had attended high school or madrasa (Islamic High School), and nine percent had matriculated. None, however, had gone to college. Eighty seven percent of them were owner-cultivators and only seven percent were tenant share croppers. One was a businessman and one a teacher, but none were in government service.

Senior Retired Government Officers. This group of 45 were identified through 9 initial nominations by the President of the Retired Government Officer's Club of Bangladesh, and then by "snow-balling" further nominations from the initial nine. All the retired senior government officers were over 60 years of age. They all had an excellent command of English with a B.A. Degree, usually from Calcutta University (66 percent) or from Dacca University (22 percent), but a few had been at Aligarh University. Sixty percent had an M.A. or L.L.B. as well. Most had been disciplined in history, economics, political science, English literature, or law, but eleven percent had been trained in the sciences, before entering the service as district magistrates. Most of them had joined the Bengal or Assam Civil Service or the Indian Police Service in the 1930's. They had been in service for an average of forty years and each had served in an average of ten posts, in both urban and district stations. Ninety percent had at least visited every one of Bangladesh's nineteen former districts, and many of them had visited all

of the fifty-nine earlier subdivisions. Only 10 percent had been posted in fewer than 14 districts and only 9 percent had visited fewer than 15 districts. Many of them (50 percent) had also served in Pakistan (former West Pakistan) and 40 percent had taken work-study tours to such places as the U.S.A. Fifty percent of them had reached the rank of Secretary before retirement in the early 1970's. Twenty two percent of them, moreover, had recently been recalled from official retirement to serve in senior administrative or consultative capacities to the Martial Law Government established in 1976. Ninety percent had been involved in relief administration during their service career, and 45 percent had worked in famine relief during the 1943 famine. Seventy eight percent of them had read through the Bengal Famine Code.

Aid Distributors. This group of 45 were selected from a list drawn up by the staff of the Ministry of Relief and Rehabilitation, the United States Agency for International Development (USAID) Dacca staff, and by the Director Agricultural Development Agencies in Bangladesh (ADAB), the coordinating body for voluntary agencies in Bangladesh. Roughly half of this group were Bangladeshi's and half were foreign nationals from the U.S., the U.K., Sweden, Germany, The Netherlands, Australia, and Sri Lanka. This 23:22 ratio is, I think, representative of contemporary relief and rehabilitation decision-making at a national scale in Bangladesh. They were all administrators in aid distributing organizations, with 11 percent from the Ministry of

Relief and Rehabilitation, 18 percent from private Bengali aid agencies, 16 percent from technical aid sections in the various foreign embassies, and the remainder from foreign-funded aid agencies in Bangladesh. The expatriate component included persons on the traditional two year assignment abroad. Most had either had "on the job training" with a relief type of development mission, or with the civil service, or else had been educated in either international management or administration. Some 11 percent of the group had also gained broader experience (and probably some biases as well) from other famine areas such as the Sahel or Nigeria. During their time in Bangladesh, 20 percent of the expatriates had never been outside Dacca, and only 14 percent of the expatriates had worked outside a district town. On the average, however, the aid distributors had been to all but four or five districts of Bangladesh. Eighty one percent of them were professionally involved in relief or development programs operating in one or more districts. Sixty six percent were supervising relief or development programs in areas they themselves later declared to be "areas liable to famine".

Technical Experts. This group of 45 were selected from 9 fields of expertise. These fields were initially identified from factors suggested in the Bengal Famine Code (Government of Bengal, 1913) as being problems pertinent to the delimitation of famine areas in Bengal. With the help of the World Food Program Representative in Dacca, I modified these suggested factors to fit contemporary expertise.

The nine fields were:

1. Agriculture
2. Agricultural Economics
3. Climatology
4. Food Storage
5. Population Problems
6. Public Health Nutrition
7. Social Science
8. Transport Logistics
9. Water Resources

Experts from within each field of expertise were nominated by both the Planning Commission of the Bangladesh Government and by the staff of USAID, Dacca, each nominating approximately 50 percent of the group. Again, about half were Bangladeshis and half were foreign nationals from the U.S. (19 percent), the U.K. (11 percent), The Netherlands (3 percent), Norway (5 percent), South Africa (3 percent), Australia (3 percent), and Haiti (3 percent). Only 5 percent of them were women. The technical experts served as staff members in departments of the Bangladesh Government, (31 percent), other Bengali institutions (23 percent), and as overseas technical consultants with U.N., (20 percent), bilateral missions (14 percent), or other agencies (11 percent). Fifty percent of the technical experts had visited all but two of Bangladesh's 19 districts, but only 30 percent of them had worked in the rural areas outside of a district town for more than three months. Sixty percent

of the expatriate Technical Experts had been working in Bangladesh for over 5 years. Thus the average technical expert had worked in Bangladesh between 7 and 15 years, substantially longer than the average aid distributors. Only 22 percent of the technical experts had ever read the Bengal famine code however.

Stage 1. Open Ended-Questionnaires.

After pilot testing with a class of university students, and a small number of representatives from each group, open-ended questionnaires, with 18 general questions about famine, famine prediction, famine prevention, and the background of the respondents, were adapted for administration to each of the four groups of 45 people, (Appendices A, B, C, D). The questionnaire for the village elders was translated into Bengali, and questions relating to areas outside the village were removed. The questionnaires were administered in Bengali to the village elders by Dacca University students with homes in that region, after the researcher had visited the area and chosen the sample of murrubbis and monitored the pre-testing of the questionnaire. Sixty-six percent of the questionnaires to the other three groups were administered by the researcher himself. The remaining 34 percent were administered by his principal research assistant who had accompanied the researcher on the initial interviews.

The interviews were conducted in relaxed conditions. Those with the village elders were usually administered with the

interviewer and respondent both sitting on piris (3-4 inch high bench seat for squatting on) and surrounded by family and village members, some of whom might add supportive or corrective information in between puffing contentedly on their hookah (water-pipe). The interviews with the retired government officers were normally conducted over nashta (refreshments) either in the early morning or just before dusk or at night. During Ramzan (the month of fasting), the possible hours were limited by the five waqt (times) of namaz (prayers), which were rigidly adhered to by the majority of the retired officers. The average times for interviews with these first two groups were 60 minutes and 75 minutes, respectively. Interviews with the aid distributors and technical experts were substantially shorter, lasting for an average of only 35 minutes and 50 minutes respectively. The majority of these interviews were conducted in the offices or at the place of work in less relaxed conditions, but attempts were made to interview as many of them as possible when they were at home. The interviewing of these four groups continued over a period of eight months; no one refused to be interviewed.[2] In each of the 180 interviews, the respondents were first asked for their definition of both scarcity and famine and they were next asked to describe the critical point at which scarcity became famine (See earlier). They were then invited to

[2]Ministry of Relief and Rehabilitation Seal helped.

comment on the possibilities of being able to predict famines in Bangladesh (see earlier). After this the respondents were given a crude, but operational definition of famine, i.e., "a situation in which government gruel kitchens have to operate," and were asked if there were certain factors which made some areas of Bangladesh persistently more liable to localized famine. (The murrubbis were asked if there were certain factors that made their particular village more liable to famine than other villages.) Apart from three respondents who said they did not know, the remainder of the 180 respondents said "Yes". Those who had answered "Yes" were then encouraged to list what the factors were. The respondents provided a list of six responses on the average. These were then included in an overall list of 60 factors (Table 5i).

Mental Maps

The respondents from three of the groups, i.e., senior retired government officers, aid distributors and technical experts, were then asked to map those areas that they though were persistently more liable to localized famine, where government gruel kitchens had to operate.[3] This they

[3]This free mapping response format for mapping environmental hazards has recently been demonstrated and documented in the developed world by Smith (1976), but was initiated by the researcher and his colleagues in mapping environmental hazards in Hilo, Hawaii in 1973. (Currey et al., 1973).

did by ringing the areas with a felt pen on a tracing paper overlay registered on a large 40" x 50" standard reference map of Bangladesh (1:500,000) which was positioned on a large sloping easel. The reactions to this request were then recorded for each member of each of the three groups. Three of the 135 persons said they were unable to complete the task. Five others were observed to be having difficulty in reading the reference map. The remaining 127 people completed the task within ten minutes. Four distinctive characteristics in the application of this method were noted.

1. Respondents ringed broad and unspecific areas rather than attempting to delimit particular boundaries. This may reflect both a lack of specificity in the real areas liable to famine, as well as the respondents understandable generalization because of inadequate knowledge. Also it is probably the normal reaction to such an exercise.
2. Respondents were found to avoid outlining up to and over the international boundary, and over all the deltaic islands. Thus at a later point high values in the center of the islands, e.g., Bhola, or areas within 5 kms. of international boundaries, e.g., Rowmari, were 'extended' to the coastline or to the boundary line.
3. Some respondents ringed "placees" e.g., Faridpur, while others ringed "areas" over which certain phenomena, e.g., flooding, occurred.

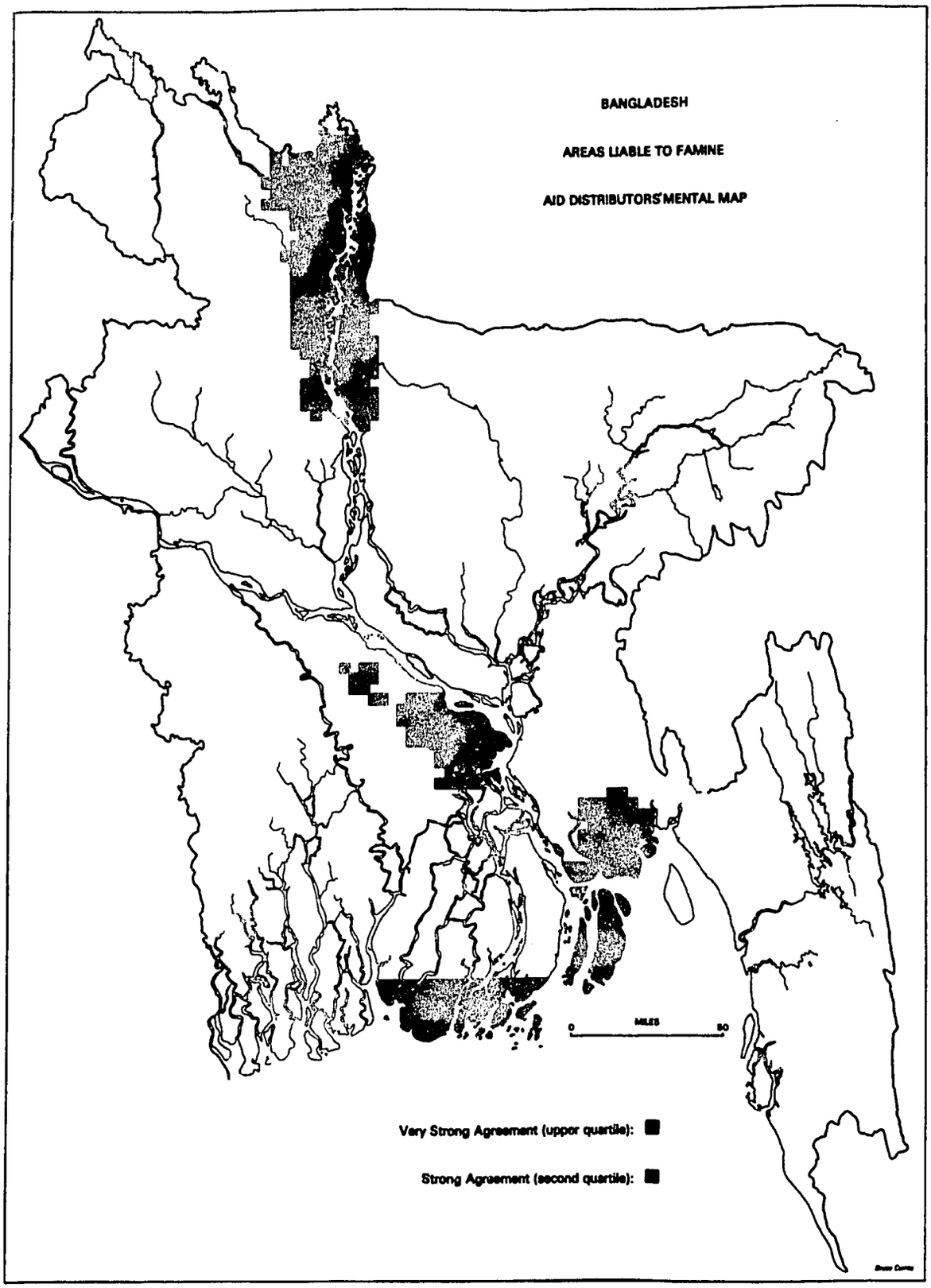
4. Some respondents appeared to associate famine with the name of a place, e.g., Faridpur, without knowing its areal dimensions. They might thus ring an area after locating Faridpur Town rather than locating the whole district.

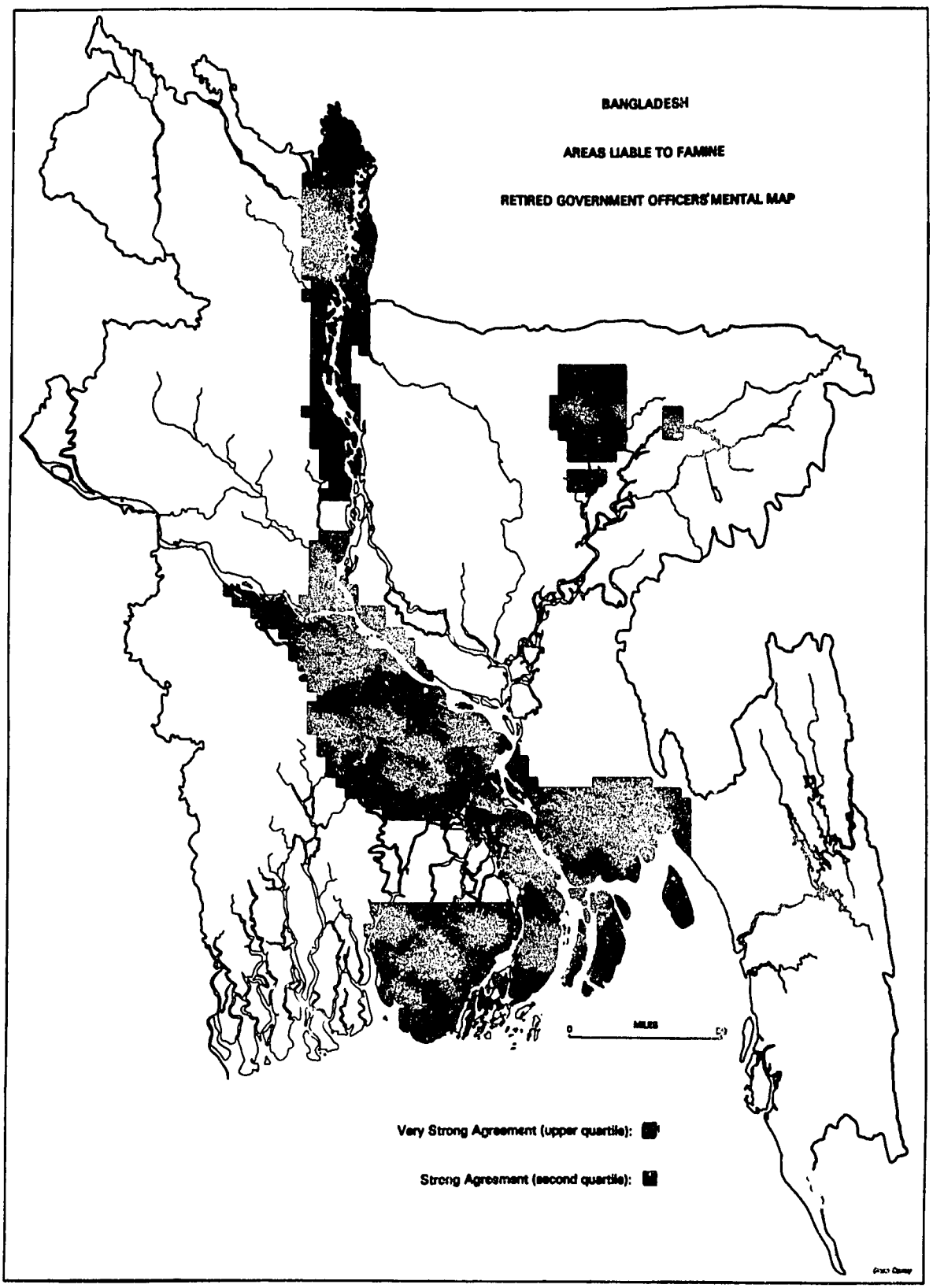
After completion, the map overlays were collated on a base map of 5 kilometer by 5 kilometer grid cells. If 50 percent or more of a grid cell fell over an area outlined by a respondent, that grid cell was allocated a weight of 1 point. If it fell over an area outlined by two respondents it was allocated two points and so on. The points for each of the 3125 cells on each of these maps were then totalled and the upper and second quartiles were then chosen as areas of "very strong" and "strong" agreement for each of the three groups.

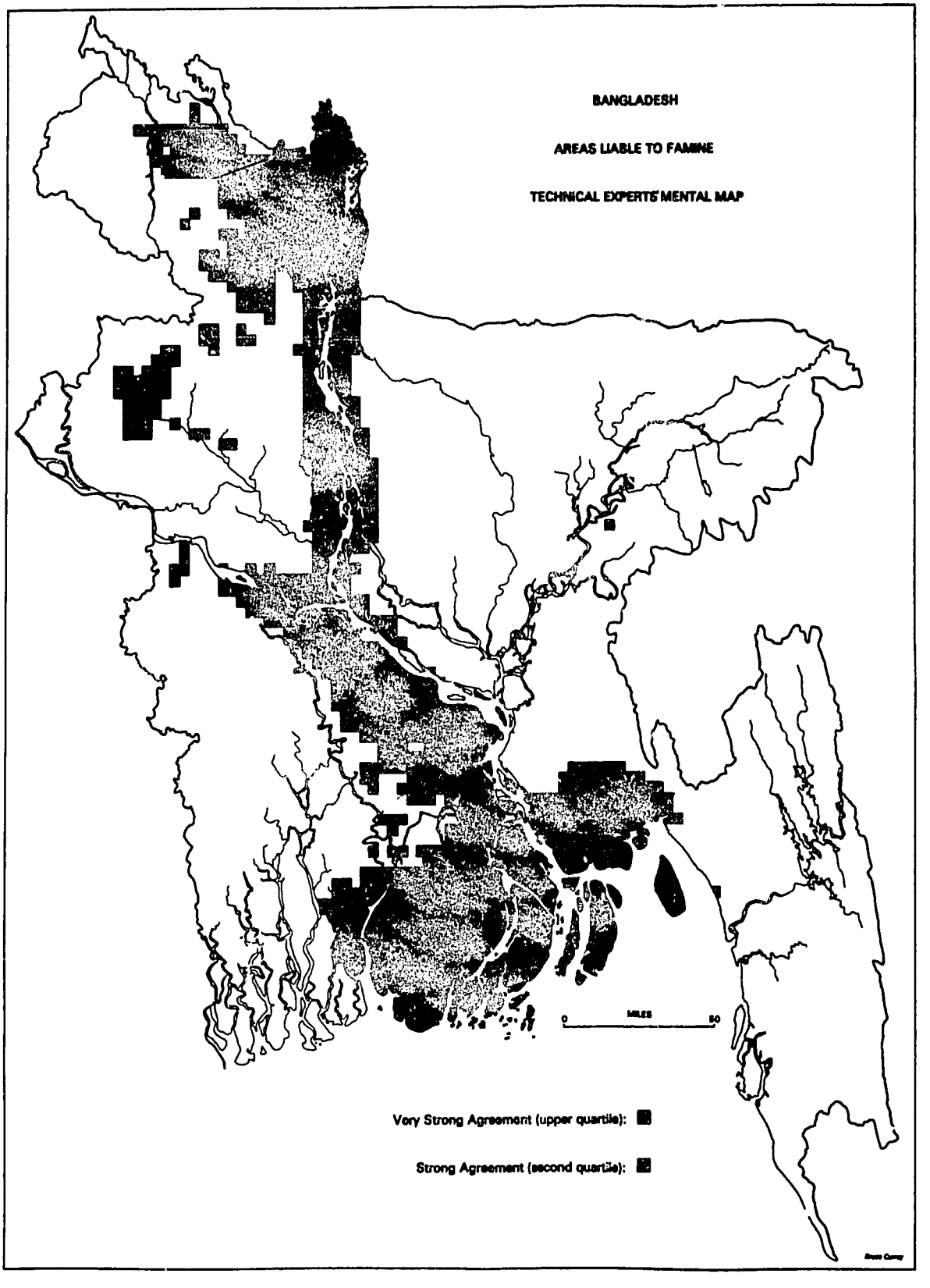
These composite "mental maps" (Map 5i, 5ii, and 5iii) of areas liable to famine exhibit a pattern which is consistent for all three of the groups. The retired government officers, aid distributors and technical experts all agree that the Jamuna channel, Faridpur and the coastal and island areas of both Barisal and Noakhali on either side of the Meghna Delta, are areas liable to famine.

There are slight inconsistencies between groups.

1. <u>The retired government officers</u> are not in "very strong agreement" on the famine liable area of eastern Rangpur. This may be because their longer time perspective supports a greater emphasis on


BANGLADESH
AREAS LIABLE TO FAMINE
AID DISTRIBUTORS' MENTAL MAP
0
MILES
50
Very Strong Agreement (upper quartile):
Strong Agreement (second quartile):


BANGLADESH
AREAS LIABLE TO FAMINE
RETIRED GOVERNMENT OFFICERS' MENTAL MAP
MILES
Very Strong Agreement (upper quartile):
Strong Agreement (second quartile):


BANGLADESH
AREAS LIABLE TO FAMINE
TECHNICAL EXPERTS' MENTAL MAP
0
MILES
50
Very Strong Agreement (upper quartile):
Strong Agreement (second quartile):

Noakhali, Bhola and Faridpur. It may be, however, that having mostly retired in the early 1970's they were less involved in the 1974 famine in eastern Rangpur than were the other groups. Unlike the other groups, the retired government officers were, however, in "strong agreement" that the boro-growing haor area of Sylhet was an area liable to famine. This may be because recent improvements in the area, by the introduction of high yield variety rices and drainage had not been implemented during their period of service. Their "strong agreement" on the Sylhet area may also be because they associated flooding with famine, and assumed a direct relationship in all areas including the extensive flooded basin areas of Sylhet. This latter suggestion may also partly explain their "strong agreement" on extending the famine prone area of Faridpur south-westwards to include the river and the bil (swamp) areas of Gopalganj.

2. The Aid Distributors unlike the technical experts and the retired government officers, were only in "very strong agreement" about one area: Eastern Rangpur, the area of the 1974-75 famine. Other areas were given lesser emphasis. This probably reflected their short average period of involvement with famine problems in Bangladesh. It also probably resulted from their recent involvement with the eastern Rangpur famines.

3. <u>The Technical Experts</u> tended to detail more areas than the other two groups. They were in "very strong" agreement on three main areas: the Jamuna Channel, Faridpur and the coastal areas near the mouth of the Meghna. It is noteworthy that their areas of "very strong agreement", unlike those of the other groups did extend downstream to the southern part of the Jamuna channel and included a much larger area of the cyclone-prone coastal area. Their area of strong agreement included Sandwip island. Surprisingly they did not register "very strong agreement" in the case of eastern Faridpur e.g., Bhedarganj. Their areas of "strong agreement" did include the old flood water channels and drought prone interfluves of North Bengal, two small outliers in south-western Sylhet, and a small outlier on the Chittagong coastal plain.

After completing his or her mental map, the respondents from those same three groups, was then asked to explain why each of the areas they had ringed were liable to famine. These responses were then integrated into Table 5iA as an attempt to augment or reinforce the initial question of why certain areas of Bangladesh were persistently liable to famine. The respondents from the three groups were then asked first, what the villagers themselves could do, and then what the central government could do to prevent famine returning to those areas which they had ringed. The village elders were

similarly asked what they themselves could do, and then what the central government could do to prevent famine returning to their village. The responses to these questions on famine prevention are described later in Section 7. The open-ended questionnaires were then completed by a series of questions about the respondent's training and experience in Bangladesh, particularly in respect to work in famine areas or on famine-related problems. It was hoped to use these "profiles of experience" to select the "most experienced" respondents to attend the later stages in the Delbecq-Delphi Process. (Figure 5iii).

Stage 2: Editing by Technical Experts:

The list of 60 factors thought to make certain areas of Bangladesh liable to famine (Table 5i) was then divided up into smaller lists, according to the most pertinent field of expertise and then given to the most appropriate of the selected technical experts[4] from each of the nine fields for editing.

For each factor in their own short list, the experts were asked to evaluate if there were nation-wide quantitative data available which was sufficiently comprehensive, reliable, and for "sufficiently small areas" to aid in mapping thanas liable to famine in Bangladesh. If not, they were asked to suggest a surrogate for which information might be available,

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[4]The experts selected for editing were the same as those selected for the Delbecq and Delphi sessions. The process by which they were selected is therefore described below under Stage 3.

Best Available Document

A COMPARISON OF THE LISTS OF FACTORS CONSIDERED TO PREDISPOSE CERTAIN AREAS OF BANGLADESH TO FAMINE AT DIFFERENT STAGES IN THE DELBECQ-DELPHI PROCESS

A. Initial list of 60 factors suggested in response to the question: Why are some areas of Bangladesh more liable to famine than others?	B. Second list of 40 factors suggested in response to the question: Why is such and such an area (which the respondent had just ringed to indicate a proclivity to famine on a mental map of Bangladesh) more liable to famine than other areas?	C. List of 30 remaining factors from the initial list after editing by the technical experts.
(a) Production	(a) Production	(a) Production
1. Blights/pests	Blights/pests	Blights/pests
2. Cyclones	Cyclones	Cyclones
3. Crop failures (unspecified)	Crop failures (unspecified)	Crop failures (unspecified)
4. Droughts	Droughts	
5. Earthquakes	Earthquakes	Earthquakes
6. Excessive and/untimely rainfall	Excessive and/untimely rainfall	
7. Flash floods	Flash floods	Flash floods
8. Floods	Floods	Floods
9. Hailstorm	Hailstorm	Hailstorm
10. Infertile and/or drought susceptible soil	Infertile and/or drought susceptible soil	Infertile and/or drought susceptible soil
11. Lack of irrigation	Lack of irrigation	Lack of irrigation
12. Low crop yields	Low crop yields	Low crop yields
13. Low lying areas	Low lying areas	
14. Marginal land	Marginal land	Marginal land
15. Natural disasters (unspecified)		
16. Poor agricultural methods (unspecified)		
17. Poor drainage and/siltation		
18. Principal bore areas	Principal bore areas	
19. River affected areas (unspecified)	River affected areas	
20. River erosion	River erosion	River erosion
21. Salinity	Salinity	Salinity
22. Sediment dumping	Sediment dumping	Sediment dumping
23. Storms and/high winds	Storms and high winds	Storms and high winds
24. Tidal bores	Tidal bores	Tidal bores
25. Vulnerable one crop areas	Vulnerable one crop areas	
(b) Efficiency in Using Production	(b) Efficiency in Using Production	(b) Efficiency in Using Production
26. Administrative structure		
27. Areas of new settlement and immigration	Areas of new settlement and immigration	Areas of new settlement and immigration
28. Chronically malnourished areas	Chronically malnourished areas	
29. Chronic poor areas	Chronic poor areas	Chronic poor areas
30. Dacoities		Dacoities
31. Excessive social activities (especially marriages)		
32. Excessive subdivision of land		
33. Food deficient areas	Food deficient areas	Food deficient areas
34. Graft and corruption		
35. High percentage landless	High percentage landless	
36. High unemployment rates		
37. Inequities in the price of rice	Inequities in the price of rice	Inequities in the price of rice
38. Inflation		
39. Poor management system (especially procurement)		
40. Population pressure	Population pressure	Population pressure
41. Smuggling	Smuggling	
(c) Storage and Savings	(c) Storage and Savings	(c) Storage and Savings
42. Areas with few large landholders		
43. Hoarding		
44. Indebtedness		
45. Lack of alternative employment	Lack of alternative employment	Lack of alternative employment
46. Lack of education		Lack of education
47. Lack of stocks	Lack of stocks	
48. Lack of storage capacity	Lack of storage capacity	Lack of storage capacity
49. Seasonal labour scarcity or harvesting time	Seasonal labour scarcity or harvesting time	
50. Shortage of capital/savings/credit		
51. Shortage of fertilizer		
52. Shortage of plough cattle		
53. Shortage of seed		
54. Stress on kinship ties		
(d) Degree of Isolation	(d) Degree of Isolation	(d) Degree of Isolation
55. Isolated char areas	Isolated char areas	
56. Isolation	Isolation	Isolation
57. Maldistribution of agricultural inputs (unspecified)	Maldistribution of agricultural inputs (unspecified)	Maldistribution of agricultural inputs (unspecified)
58. Poor land transport system	Poor land transport system	Poor land transport system
59. Poor water transport system	Poor water transport system	Poor water transport system
60. Social and political isolation and disturbances	Social and political isolation and disturbances	Social and political isolation and disturbances

e.g., instead of areas with "excessive social activities," it was suggested that the "variations between markets in the price of beef on the eve of Eid-ul-Azha sacrifice" be used as a surrogate. Often the articulation of a concept had to be crude if the reliability of the data was to be maintained. Thus with no reliable acreages for cropped areas it was necessary to define a concept like "population pressure" in terms of gross population density, rather than refining it to include arable cropping intensity as the denominator.

If information either for the original factor or for any surrogates suggested were unavailable, that factor was removed from the list (see Table 5i). It might be argued that these omissions were equivalent to "throwing out the baby with (or even instead of) the bathwater," and that it was the more important correlates of areas liable to famine that were mistakenly omitted for want of available information. However, the factors left on the list (Table 5iC) are more likely to be "the baby" than "the bathwater," because the list of the factors remaining after editing is significantly more similar to the list provided by the respondents after they had ringed the areas they thought were liable to famine (Table 5iB). Thus once they had focused their attention upon the famine liability of particular areas, respondents omitted many "bathwater"-like factors such as "graft and corruption" and "poor administrative structure," which although possibly contributing significantly to famine liability, need not necessarily have aided in the differentiation of particular areas liable

to famine. Nevertheless certain pertinent factors, e.g., "high percentage of landless cultivators," were unfortunately omitted for want of sufficiently reliable data.[5] Moreover, the limitations of available data limit all forms of research and the problem is unusually acute for nationwide areal data in a developing country.

Each of the nine experts was then asked to suggest, for each of their short list of factors, critical or "go-no-go" values. The area delimited by mapping those values of a factor which were above the critical value was judged to be equivalent to the area in which the factor was correlated with the areas liable to famine.[6] For some factors the critical value was stated as some amount of variation above or below the national mean for the value being measured, e.g., population pressure -- areas with a population density one standard deviation greater than the mean; for other factors, the areas so designated by a reputable survey group, e.g., Soil Survey of Bangladesh, were taken as the critical areas, e.g., areas liable to river erosion.

Stage 3 - Delbecq Sessions:

The list of the 30 edited factors, each with its

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[5]Since this time, Dr. T. Januzzi has carried out a national survey of the landless population of Bangladesh for the U.S. Agency for International Development, Dacca. This survey was, however, done on a sample survey and unfortunately does not include thana by thana information.

[6]The assumption that technical experts can indeed perceive such thresholds and foresee the national pattern is suspect

critical value, was then circulated to the members of three separate groups of nine selected retired government officers, aid distributors and technical experts. Unfortunately it was not possible to include the village elders in the latter stages of the Delbecq-Delphi process. There were both logistic and language problems[7] which would have prevented the village elders from being involved in the Delbecq-Delphi sessions. Also it is unlikely that the village elders would have had a sufficiently nationwide perspective to have helped in the final stages of mapping the areas liable to famine.

It was mentioned earlier that I had planned to select for each of the three groups the nine persons from the original groups of 45 who had the greatest experience with famine situations in the rural areas of Bangladesh. Those initial selections had to be changed, however, due to the realities of the situation. Many of the originally-selected panel members were ranking officials with numerous responsibilities that would have made it impossible for them to attend all the sessions. Others had to cancel because of deaths in their families. Changes in the scheduling of Delbecq-Delphi meeting nights because of events such as the death of the national poet, Kazi Nazrul Islam, or the death of Mao Tse Tung also made it impossible to maintain the initial selections.

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[7]Note: Andre L. Delbecq has, however, used the Delbecq Technique for a comprehensive health planning exercise in Micronesia, using translators to facilitate communication between group members speaking different languages (Delbecq, Van de Van and Gustafson, 1975).

Thus, although I initially attempted to maintain the validity of "the careful selection of panelists on the basis of professional training and scaled experience levels" (Sackman, 1975), this was not possible. As an observer, however, I judged that the eventual group members, although not all the most experienced in famine problems and rural areas, were at least equivalent to or above the average experience levels of the initial three groups of 45 members whence the three sample groups of nine members were drawn.

The three groups of nine members met nominally on three separate occasions. In terms of creativity, it has been argued that it would have been more productive to have had the three groups interacting (Delbecq, Van de Van, and Gustafson, 1975), but there are counter arguments (Van de Van and Delbecq, 1971). I decided that such discussion between the groups with my lack of training in group discussion methods, might have led to "maximum feasible misunderstanding" (Moynihan, 1969). Thus, just as I had decided to use the nominal group technique to minimize interaction, so I also opted to keep all three groups apart, although they were each evaluating the list of factors derived from all the four initial groups.

I chose to have nine members in each of the groups for three reasons:

1. The same groups were to be used for both the Delbecq and the Delphi sessions. For Delphi studies, a group of nine maximized the effect of large group

sizes; it traded off average group error in judgements. (Dalkey, 1969), against decreasing "manageability", with increasing group size. (Bouchard and Hare, 1970). (Figure 5iv).

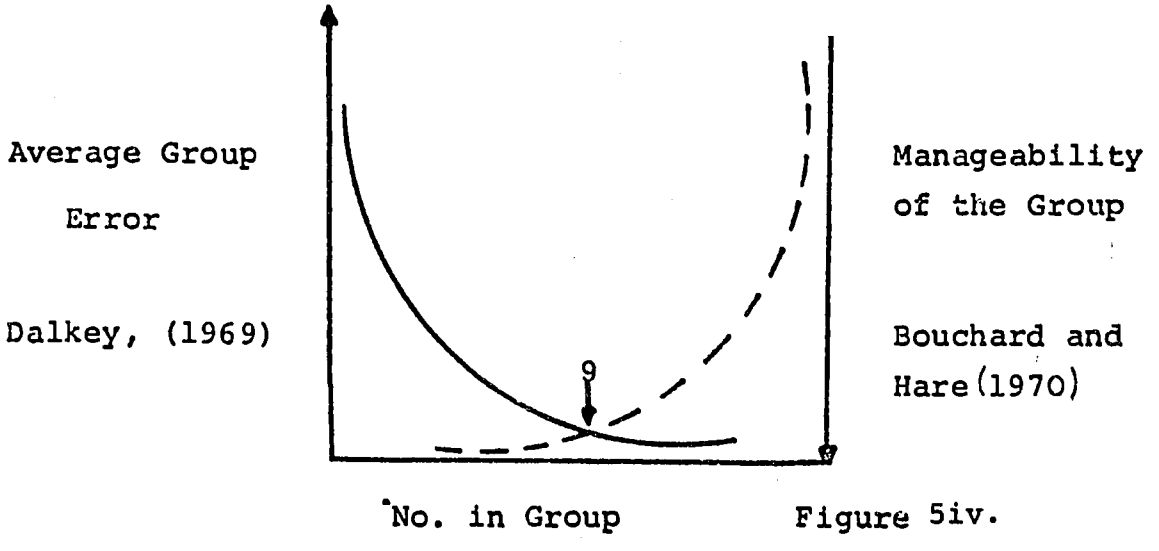

Figure 5iv.

2. Nine was also an aliquot part of 45, the number in the original groups. (Figure 5iii)
3. Being an odd number, the median judgement of the group on any item could rapidly be derived by ranking the values and determining the value of the middle value i.e., the 5th.

At each of the three Delbecq sessions[1] the nine members initially met informally to discuss the list of thirty factors and the critical values that had been distributed previously. Where possible, the group moderator, in this case the researcher, answered any questions on the meaning or the terminology used in the list. On one occasion, when the nine technical experts met, the session was continued without the group being in general agreement on the criterion used for the delimitation of drought.

After the initial discussion, the nine members then became a nominal group and were asked to rank in terms of their importance in differentiating the areas liable to famine, the five most important factors from the list of 30 they had previously considered. Each group member placed on a 3" x 5" card marked "First Choice", the number of the factor he thought was most important and handed the card to the moderator. Each member then wrote the number of the second most important factor on the card marked "second choice" and so on, until they had handed in all five cards in less than 10 minutes. The rankings for all the group members were then aggregated by assigning any factor given a "first choice" ranking

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[1]The Delbecq and Delphi sessions were held on three separate evenings, around a specially constructed circular table, at the Dacca residence of the researcher. The system was pretested with a group of University students from the Department of Geography, Dacca University. Official invitations were sent out to each group member. Transport was provided where necessary. The Delbecq session was conducted over an appetizer before the main meal. The Delphi session was completed during the coffee hour.

a score of 5, any given with a "second choice" ranking a score of 4 etc.. The scores for each factor were then added and arbitrarily the 10 highest ranked factors for each of the groups were selected for later analysis in the Delphi session

Stage 4: Delphi Sessions

The ten highest ranked factors for each of the groups were then typed on nine 10" x 8" cards

and distributed to each member of the nominal group. Each card contained a number which identified the particular group member.[1] Cards did not include a column for "self rating" (Dalkey, 1969), in which group members could indicate a subjective assessment of their own competence to evaluate any particular factor. Although Dalkey found such ratings could be used to further analyse the weightings, I omitted them after the pilot study[2] because the additional column appeared to confuse respondents. Also each card contained at the top the list of factors and a pilot test factor, typed in italics, to demonstrate the rationale of Delphi to the participants. The group was asked to "guestimate" the population of Dacca City as defined and documented in the 1974 census. Answers varied between

[1]Each member sat by a prominently displayed identification number on the circular table. These numbers aided in the rapid matching of respondents of Delphi cards during the session.

[2]The system was pretested in Dacca with a group of university students from the Department of Geography, Dacca University.

.5 million and 7 million on the first round for the senior retired government officers. The first round median was 1.5 million. After being informed of the first round median, some members of the group reassessed their initial judgements and the second median was found to be nearer the documented value of 1.73 million. This example was also used with the other two groups, the aid distributors and the technical experts. Both recorded similar ranges of deviation in the first round. Both, however, recorded medians of 1.6 million for both the first and second round medians. This unwillingness to change shown by the latter two groups as compared with the retired government officers was continued into the later weightings of the 10 factors.

After this initial example, each member of the nominal group was asked to score each indicator or factor as defined by its critical value, on a scale from 0 to 100, just as if they were marking a school examination. An indicator judged to be exactly equivalent to the areas liable to famine in Bangladesh was to be assigned a score of 100. Those indicators judged to be less equivalent, were to be assigned progressively lower scores. Members of the nominal group then handed their Delphi cards, face downwards, to the mediator who was able to quickly select the median valued for the group i.e., the fifth ranked value, and thus the middle card, for each indicator. These 10 first round medians were then quickly written on each of the nine Delphi cards, and then each member's card was returned to him.

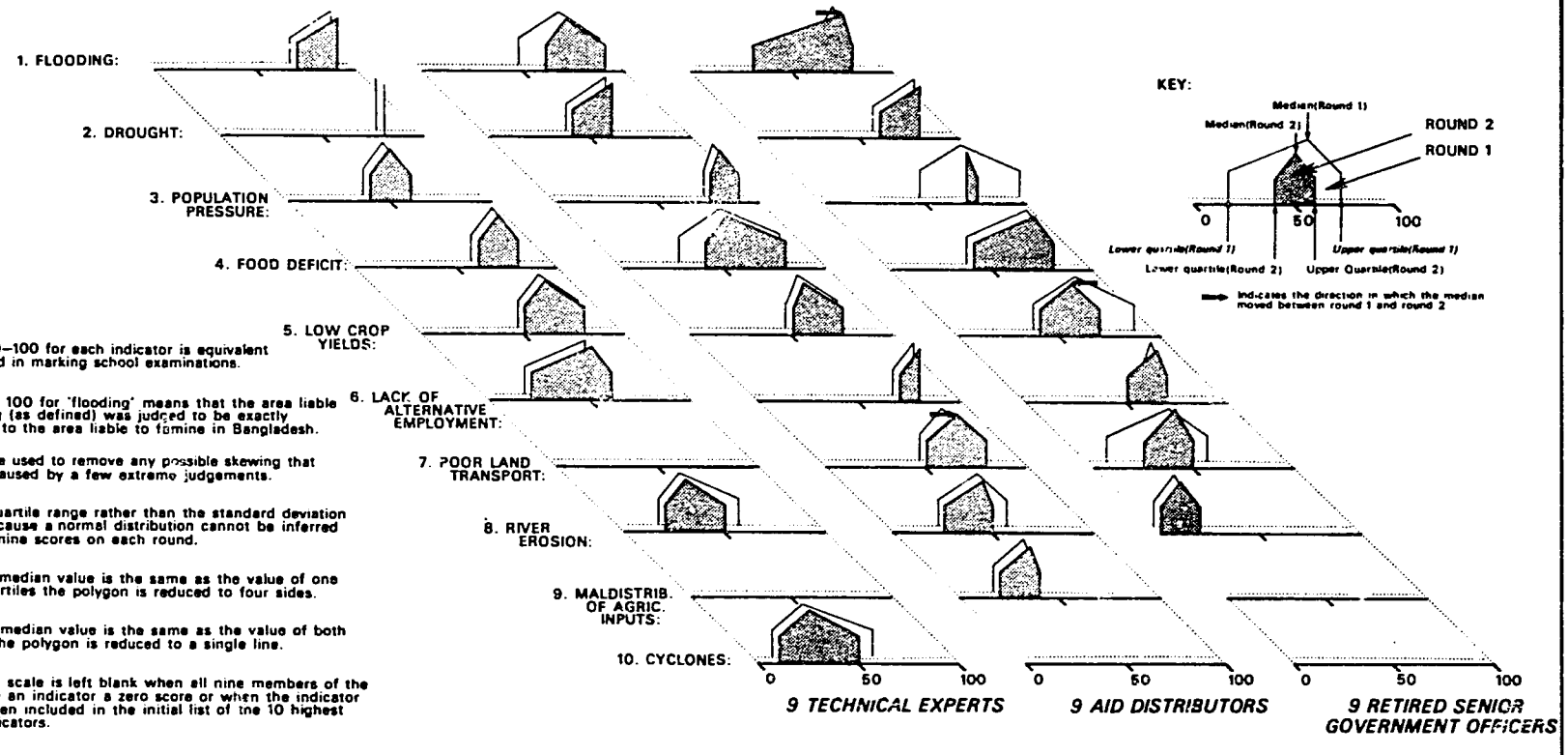
The mediator then invited group members, if they wished, to change their scores after seeing and hearing the "average" (the median) of the group for each indicator from the first round. After any changes were made the cards were collected and the second round medians were then calculated. No further rounds were initiated. It had been decided, prior to initiating the session, only to have two rounds, thus "maximising the possibilities of lessening group error after iteration" (Dalkey, 1969), and yet minimising lack of interest during successive iterations.

All Delphi sessions were completed in a convivial atmosphere. The retired government officers stated they had enjoyed playing the game. Their Delphi session was very much a reunion night for former colleagues. When any of the retired government officers asked a question on how to complete his Delphi card, one or other of his colleagues would carefully explain the method to him. Several of the aid distributors appeared to have difficulty in comprehending the different significance of factors which were associated with variations in famine liability within Bangladesh, as opposed to factors that made Bangladesh as a whole vulnerable to famine. A few of the technical experts appeared to be uneasy in trying to weight the indicators because they disagreed with, or were unable to assess, the areal implications of the critical values assigned.

The broad results of the three Delphi sessions are analysed graphically in Figure 5v), which shows the patterns

Analysis of 3 Delphi Sessions

Analysis of 2 Rounds on 10 Indicators by 3 Nominal Groups



NOTE

1. The scale 0–100 for each indicator is equivalent to that used in marking school examinations.
2. A score of 100 for 'flooding' means that the area liable to flooding (as defined) was judged to be exactly equivalent to the area liable to famine in Bangladesh.
3. Medians are used to remove any possible skewing that might be caused by a few extreme judgements.
4. The interquartile range rather than the standard deviation is used because a normal distribution cannot be inferred from only nine scores on each round.
5. When the median value is the same as the value of one of the quartiles the polygon is reduced to four sides.
6. When the median value is the same as the value of both quartiles the polygon is reduced to a single line.
7. The 0–100 scale is left blank when all nine members of the group gave an indicator a zero score or when the indicator was not even included in the initial list of the 10 highest ranked indicators.

Bruce Carney

136

of the medians and interquartile ranges for rounds one and two on all 10 indicators for each of the three groups.[1] There was certainly general agreement in the ordinal scoring of the 10 indicators by the three graphs. This is shown by the general leftward displacement of the medians in all three groups between indicator 1 and 10. Although there were some changes in weightings between rounds one and two and deviations did decrease in some instances, as exemplified by the 2nd round black polygon being shorter horizontally than the white polygon, there were two instances in which there was actually more deviation in the second round than in the first round. The median actually moved in only three instances, each time on a different indicator. Visually interpreting the polygons, I surmise that the groups had difficulty understanding the concepts within the indicators that they were being asked to weight. This is specially reflected by the broad polygons on the initial round seen in the scores of the retired senior government officers. It was very different for a panel member, such as a retired senior government officer, to score a specific almanac-like question, such as the population of Dacca City in 1974, compared with a nebulous concept, like "population pressure", even though a statistical definition was included.

On the basis of the overall ordinal consistency among the three groups, I assumed that an amalgamation of the groups' interval scores would be the best estimate I could determine

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[1] The omission of the upper and lower quartiles certainly masks the extremes of variability that occurred in the assessments of some indicators, but it probably aids the interpretation of the general principals.

to weight each indicator for inclusion in an index which would allow the mapping of areas liable to famine. Each group's median scores for each of the ten indicators were then standardized against a possible total of 100, thus assigning equal weight to each of the group's judgements. The average for each of the three group's 10 median values was then calculated, and these in turn were then standardized against a possible total of 100.

Compiling the Map of Areas Liable to Famine.

It was then possible to construct a composite map of the areas liable to famine (accompanying map) by "overlaying" (McHarg, 1969) 10 component maps of an area delimited by an assigned critical value and each given a Delphi weighting. Areal data were collected for the critical values which had been suggested by the technical experts for each of the 10 indicators chosen by the three groups. I then reviewed the areal data actually available. In some cases there were less than the technical experts had suggested. Then I re-examined the critical values proposed by the technical experts. These reviews led to a reassessment of some of the definitions and critical values previously assigned to the indicators.

The ten component indicators and their weightings as a percentage (in brackets) for the composite map were finally as follows :

A. (16.4%). FLOODING AREAS: All areas suffering extensive flood damages during years of severe flooding included in 1962-67 period (BWAPDA/IBRD, 1972). The areal delimitation of this indicator is based on a 5 year period in which BWAPDA (Bangladesh Water and Power Development Authoirty) flood damage records were considered by IBRD (International Bank for Reconstruction and Development), to be relatively consistent.

B. (15.4%). DROUGHT AREAS: The area with less than 80 percent probability of receiving 2 inches of rainfall in any 2 week period during the critical Aman seedling period June 13th to September 15th. (IBRD 1972). This area was interpolated from eight control points using criteria suggested by the local agricultural expert who stressed the importance of the main rice crop to Bangladesh and the need for surface water availability at the critical rice seedling period, a factor not taken into account in traditional water balance drought definitions.

C. (13.7%). POPULATION PRESSURE: All areas with a 1974 population density which was greater than one standard deviation above the national mean. (Bangladesh Census, 1975). Without reliable small crop production statistics, population pressure was measured simply comparing the

the ratio of the thana population to the dry season land area. The latter were the values re-computed by planimeter as described in Figure 2iv and Section 2.

D. (13.4%). FOOD DEFICIT AREAS: Thanas classified as non-surplus areas, (Food Directorate, Bangladesh Government, 1977). The areas defined by this indicator are those not included in the government list of Food Surplus Thanas, based on crop production and population. As described in Chapters II and III, such figures are contestable because of variations in crop production estimates and because of internal wage labour migration bringing surplus rice back to rice deficit areas. Although the indicator is overtly collinear with the "population pressure" and "low crop yield" areas, all three groups unanimously argued strongly for its inclusion on the basis of "one of the best available indicators".

E. (12.6%). LACK OF ALTERNATIVE EMPLOYMENT AREAS: All areas with the precentage of the civilian labour force employed in agriculture in 1974 being greater than one standard deviation above the mean. (Bangladesh Census, 1975). This data was available only down to the subdivision level. It nevertheless suggested areas with a strong dependency on agriculture and little local secondary or tertiary employment. Apart from

areas near Dacca, it is unlikely to mask a large percent of the population "in service" in a large city.

F. (11.8%). LOW CROP YIELD AREAS: All non-forested one crop areas (IBRD Land Use Associations Map, 1972). This data was portrayed by Land Development Units (physiographic units) with similar soil and hydrographic conditions in terms of agricultural development. Areas where only one crop is grown may sometimes actually be high yielding areas, e.g., the boro growing areas of Sylhet, but without adequate storage facilities and without a system ensuring that surpluses are stored, they are vulnerable to famine in years where a natural disaster destroys the one and only crop.

G. (6.9%). POOR LAND TRANSPORT AREAS: All areas further than 10 kilometers from an all weather road. At present relief supplies from Dacca and Chittagong port are predominantly transported overland using the road or rail network. The rail net is even more limited than the all weather road net defined in the Bangladesh Transport Study (U.N.D.P., 1973) and 10 kilometers was approximately equivalent to a bullock cart journey through difficult monsoon landscape conditions in one day.

H. (5.6%) RIVER EROSION AREAS: Land Development Units where river erosion occurs (Soil Survey Development, 1975). Little detailed quantification of river erosion has been completed, and bank line erosion rates vary greatly from year to year. Land Development Units being physiographic units are often aligned with the major rivers and hence give a crude indication of the areas liable to river erosion.

I. (1.8%). CYCLONES: Approximate inland limit of frequent cyclone risk (Brammer, 1975). Although historical records of cyclones and cyclone tracks are available for several centuries, a quantified areal study of the intensity and frequency of cyclones is not yet available. Brammer's area of frequent cyclone risk is based on his own experience of recent cyclones over the past 20 years and his own piecing together of the historical records.

J. (1.8%). MALDISTRIBUTION OF AGRICULTURAL INPUTS: All areas of North Bengal i.e., west and north of the Jamuna and Ganges Rivers. Although there are many undocumented social and political as well as distance factors which affect the distribution pattern of agricultural inputs, the agricultural technical experts agreed that the broad area of North Bengal was consistently

and ubiquitously poorly supplied with agricultural inputs in comparison with the rest of the country.

The areas defined by each of the critical values on these ten components were then explicitly inserted as inset maps for comparison with the following map of the combined components

Combining the Components of Famine Liability:

The areas defined by each of the critical values for the ten components each had an "importance weighting" or a multiplier factor derived by combining and standardizing the results of the three Delphi sessions. These "importance weightings" were on an interval scale, and thus it was mathematically possible to combine them by addition into an areal index. The rationale for such a linear combination was marred by the observable interdependence among the components, particularly between areas of population pressure and areas of food deficit, between the latter areas and low crop yield areas and between both flood and cyclone areas and low crop yield areas. Durfee (1972), has suggested that factor analysis might be used to derive a set of independent factors in such a situation, but it seemed irrational to apply such a sophisticated technique to such a limited data base and to obfuscate weightings derived by the explicit Delphi sessions. This decision was partially supported by Hopkins' (1977) recent findings in evaluating methods for generating composite maps. According to Hopkins, "limited experimental

experience suggests that, because of the data requirements and difficulty of interpretation, using factor analysis to identify independent factors is not worthwhile".

Acknowledging the inherent weakness caused by the interdependence, the 10 area components of famine liability were combined on a 5 km. square grid system covering the entire country. If a component was found to occur in more than 50 percent of the area of any grid cell, the "importance weighting" was then entered in that cell. After such entries had been made for each of the ten components, the entries were then added to get an index value (1-100) of famine vulnerability for each cell. A frequency graph was constructed showing these index values against the number of cells with such values. (See inset graph, accompanying Map). A running mean describing the average number of cells for each 10 units of the famine liability index was then computed and drawn to minimise the artificial breaks in the distribution caused by the limited number of possible combinations of the components' "importance weightings". The "areas very liable to famine" were then classified as all those thanas having a majority of grid cells with a famine liability index value greater than 65, i.e., greater than the highest significant break in the pattern of the 10 unit running mean. (See solid black line on inset graph on accompanying Map. Similarly thanas classed as being "liable to famine" were those with index values between 65 and 45, i.e., between the highest significant break and the next highest significant break in the running mean pattern. It was then possible to map the thanas that were "very liable

to famine" (in red on accompanying Map), and the thanas that were "liable to famine" (in yellow on accompanying Map. Each thana was also assigned a pattern coding and a number to describe its actual famine index value and which of the ten components had contributed to the index value in that thana. (See main legend, accompanying Map).

SECTION 6.

How reliable is the map of areas liable to famine in Bangladesh constructed by the Delbecq-Delphi process?

The Evaluation of the Delbecq-Delphi Map

The most obvious empirical test of the predictive accuracy of the map produced by the Delbecq-Delphi method would be to compare it with the areal patterns of a significant number of future famines in Bangladesh. One expected effect of the famine vulnerability map presented here, however, is the initiation of preventive plans which would in turn hopefully lower the famine liability of certain areas. Thus, such a test could not give reliable results. Moreover, the lack of accurate information on the areal extent of past famines (Section 4) also precludes any possibility of testing the map against past geographical patterns. Thus a more subtle and inferential evaluation must be used. Specifically, it seems possible (see Figure 6i) to evaluate the map produced by the Delbecq-Delphi process by comparing the resulting map's areal consistency with:

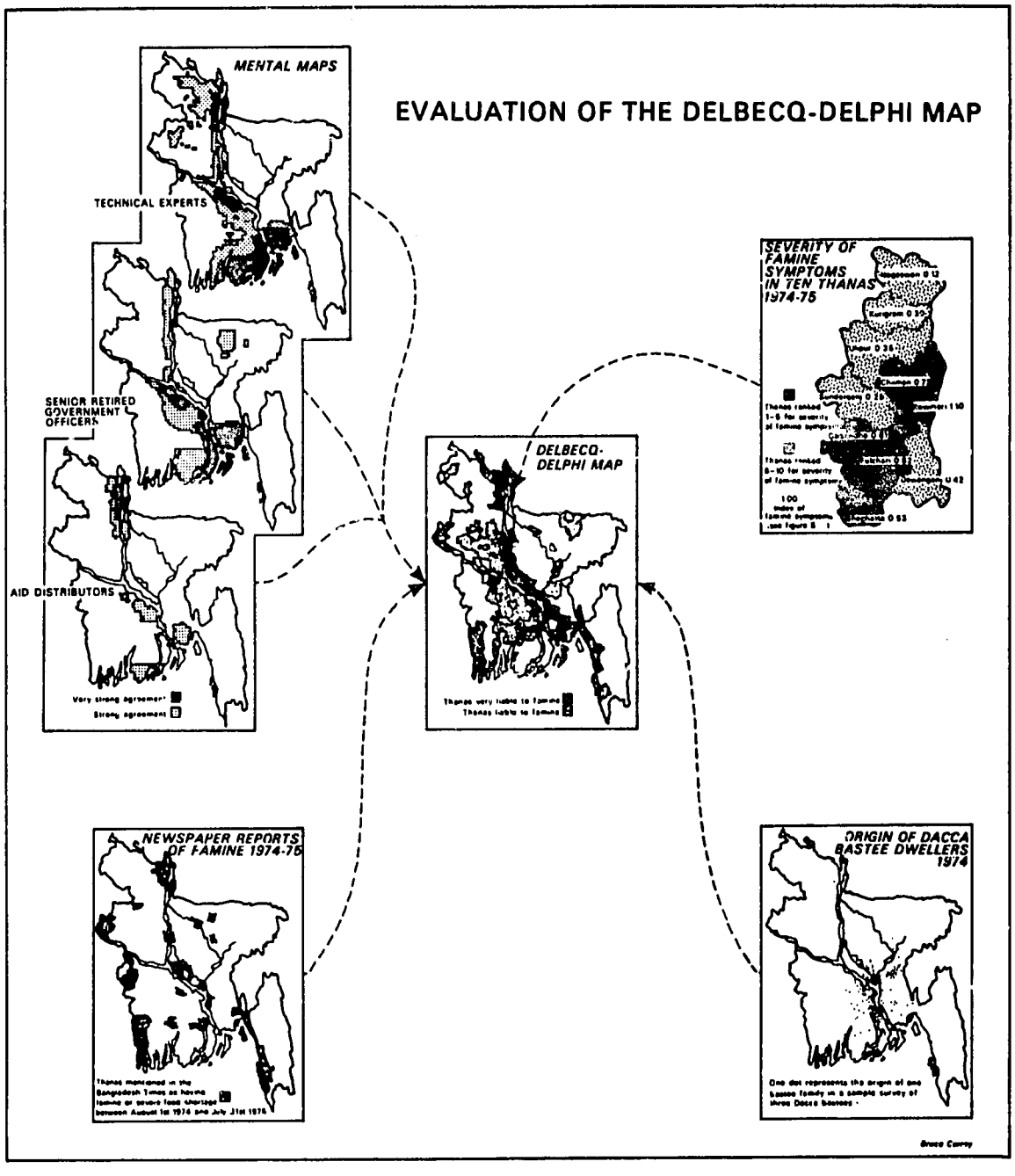
1. the combined mental maps of the three groups who constructed the Delbecq-Delphi map;
2. newspaper reports of the extent of the 1974-75 famine;
3. a map showing the place of origin of the *bustee* dwellers (squatters) in Dacca City 1974, (Qadir, 1975); and

4. a famine survey which recorded significant differences in the famine symptoms within a ten *thana* area of north Bangladesh during the 1974-75 famine.

We shall see from the first of these comparisons that the broad regional patterns portrayed by the mental maps are also repeated in the Delbecq-Delphi map. The method of constructing the latter probably gives it an inherently greater specifity than the former. The few areas of overt disagreement between the mental maps and the Delbecq-Delphi maps are probably caused by failures in both the methods of map compilation.

From the second of the comparisons we shall see that the areal pattern of famine symptoms reported in a national newspaper is very consistent with the pattern of famine liability portrayed on the Delbecq-Delphi map. The few discrepancies are not easily explainable, but they may be due to the problem of area scale i.e. comparing symptoms at one scale with causes on another.

The third of the comparisons will show that the pattern of places of origin of the *bustee* dwellers (squatters in Dacca city correlates strongly with the pattern of famine vulnerability within the probable catchment area for migration to the capital. However, the unavailability of data for other cities with different catchment regions in Bangladesh prevents a national scale comparison with the pattern of the Delbecq-Delphi map.


EVALUATION OF THE DELBECQ-DELPHI MAP
MENTAL MAPS
TECHNICAL EXPERTS
SENIOR RETIRED GOVERNMENT OFFICERS
AID DISTRIBUTORS
Very strong agreement
Strong agreement
DELBECQ-DELPHI MAP
Thanas very liable to famine
Thanas liable to famine
SEVERITY OF FAMINE SYMPTOMS IN TEN THANAS 1974-75
NEWSPAPER REPORTS OF FAMINE 1974-75
ORIGIN OF DACCA BASTEE DWELLERS 1974

However, from the fourth of these comparisons we shall see that there is almost no agreement at a local scale when the composite intensity of famine symptoms collected in a cross-sectional famine survey for ten *thanas* is compared with the Delbecq-Delphi index of famine liability for each of those same ten *thanas*. This will confirm the inability of the Delbecq-Delphi method, organized on the national scale to predict famine symptoms for any given year at the local level.

1. Comparison of the Delbecq-Delphi Map with the three Mental Maps.

   i. Consistency:

   Accepting the differences in emphasis between the groups detailed in Section 5 there is a consistent pattern of famine vulnerability in all three mental maps along the Jamuna, Padma and Lower Meghna channels and into the deltaic *chars* on the Bay of Bengal. This broad pattern is clearly repeated in the Delbecq-Delphi Map. Similarly, the "very strong agreement" on the Rangpur area of North Bengal, the riverine area of Faridpur and the coastal areas of Noakhali, is generally consistent with areas determined to be very liable to famine on the Delbecq-Delphi Map.

ii. Specificty:

Intrinsically the Delbecq-Delphi Map, with its components mapped for small units, accord- into the certain criteria, is likely to delim. a more specific areal pattern than will the aggregation of areas subjectively ringed by the large groups of mental map respondents. The tendency of the respondents to ring "places" associated with famine vulnerability rather than to delimit particular areas of vulnerability, was mentioned in Section 5. This may explain the concentration around Faridpur town in Faridpur District on the Mental Maps, compared with the specific con- centration on Madaripur subdivision around Naria, Bhedarganj, Janjira and Gosairhat, and Char Badrasen in the Delphi Map. Similarly, this greater specificty probably explains the highlighting on the Delbecq-Delphi Map of Shudharam thana in Noakhali, Barisal Kotwali Swaruphati, Jhalahati, and Rajapur in Barisal and Bhurungamari, Lalmanirhat, Kurigram, Ulipu Chilmari, Rowmari and Fulchari in Eastern Rang The lower Jamuna area greed upon by the techni experts is probably equivalent to the thanas of Kazipur and Sirajgunj, Belkuchi and Chankal on the west bank and /..

Sarishbati, Gopalpur and Tangail on the east bank. Greater specificity may also explain the Delbecq-Delphi map's delimitation of the *haor* area of northern Sylhet as opposed to the more central area ringed by the retired government officers. To suggest this would, earlier contradict the argument proposed earlier that this area was an anachronistic famine area. It may indeed be that this area is given a high liability index value because of the definition which equates one crop areas with low crop-yield areas. Certainly the *boro* areas in these *hoars* are liable to early flash flooding, but larger storage and strong national and international savings links may counteract this area's susceptibility. As a corollary of the more specific delimitation of certain *thanas* by the Delbecq-Delphi Map, *thanas* are also omitted from the broad areas of the mental maps. Sandwip Island, within easy boat access from Chittagong, is calculated not to be famine prone.

The southernmost areas of Noakhali and Barisal on the Bay of Bengal are also emphasized less on the Delbecq-Delphi map. This may be because of their lower population densities and the potential protection offered by coastal embankment project. The central area of Faridpur District (like Maksudpur Thana) is likewise emphasized

on the Delbecq-Delphi Map.

iii. Disagreement:

There are also some overt disagreements between the areas shown as being liable to famine on the mental maps and those so delimited on the Delbecq-Delphi map. These disagreements are most probably due to the inherent drawbacks of the method of mental mapping. These drawbacks may be reflected in the mental mapping of areas liable to famine by the representatives of false historical images, false peripheral images and false associative images.

Thus Chittagong coastal plain has historically been considered resilient to famine (Section 2 and Figure 2 vii). The mental maps reflect this historical image and none or the three mental maps show the Chittagong coastal plain as being liable to famine. This historical image is perhaps reinforced by the association of the coastal plain of Chittagong with the stock piles of grain imports to Chittagong port itself. However, as recognised in the 1845-49 famine in Ireland, large quantities of grain may pass by the very door of the poor and they may still experience famines. Famine liability of the Chittagong plain, because of the lack of alternative employement, the vulnerability of the single crop and the possibilities of drought flood and cyclones, highlighted by the Delbecq-

Delphi Map is substantiated both by the newspaper reports of famine conditions in the area in 1974-75 (see Figure 6i) and by my own personal observation of famine symptoms in the area in 1974-75.

False peripheral images may occur in remote border areas far from Dacca city, which may be forgotten by Dacca based respondents completing maps in Dacca city, although they know of famine susceptibility in such areas. Thus Thanas like Tetulia, Thakurgaon and Ranisankail in Dinajpur District; Gomastapur, Shibganj and Nawabganj Thanas in Rajshahi District and some of the border Thanas e.g. Tala, Debhata, Assasuni, Kaliganj and Shymnagar in Khulna District are included on the Delbecq-Delphi Map., but are not mentioned in any of the mental maps. The suggestion that these disagreements are caused by false peripheral images is unsubstantiated, and needs further study.

Finally, false associative images occur when an area is associated with a particular attribute, but localised pockets within the area are associated with different attributes. Images of these areas may be generalized in a form of ecological fallacy. Thus Comilla district as a whole is seen generally as bountiful while its famine prone pockets, e.g. Matlab,

Hajigunj, Chandpur, Faridpur and Ramganj, and the Thanas along the Gumti River are omitted from the mental maps at the national scale, but are identified in the Delbecq-Delphi Map. In this case the pattern portrayed on the Delbecq-Delphi map is corroborated both by the pattern of newspaper reports of famine and by the origin of bastee dwellers in Dacca in 1974 (see Figure 61). The newspaper reports and the Purundapur village data. (Figure liv) both indicate that famine occurred in Matlab Thana in 1974 and the origin of Dacca bastee dwellers appear to be concentrated in the thanas along the Gumti River.

In the cases of overt disagreement between the patterns on the Delbecq-Delphi map and those on the mental maps, the Delbecq-Delphi patterns appear to be more rational than those of the ment maps.

2. Comparison of the Delbecq-Delphi Map with the Newspaper Reports of the 1974-75 Famine.

The contents of the "Bangladesh Observer", one of two national newspapers in English, were analyzed in each daily edition between August 1, 1974, and July 31, 1975. This made it possible to map locations reported as having "famine conditions","severe food shortage", or "government gruel kitchens operating". A more complete record would probably have been available in the two Bengali-language

newspapers "Ittefaq" and "Dainik Bangla", because censorship of the local language paper was less severe. However, neither the two Bengali language newspapers nor the alternate English language paper "The Bangladesh Times" was available in the Federal depository in Hawaii for the analysis.

When mapping the famine areas from the reports in the "Bangladesh Observer", (Figure 6i), reports of natural disasters that did not mention resulting food problems were not included. The reports of famine conditions were not always located by thana . Those located only by district[1] were omitted. If only a subdivision was mentioned, all thanas within the subdivision were included. If a village or Union within a thana were mentioned, all thanas within the subdivision were included. If a village or Union within a thana were mentioned, then the whole thana was included. An area only needed on citation to be mapped.

The areal pattern of reported famine symptoms is consistent with the pattern of famine vulnerability portrayed on the Delbecq-Delphi map and the mental maps. Thus, the general pattern seen along the Jamuna channel from Kurigram subdivision in the north through Sirajgunj and Gopalpur thanas south into Manikgunj subdivision in the west of Dacca district, and the patterns of famine cited in the papers for Madaripur thana in Faridpur, Munshiganj in south-east Dacca, Chandpur thana in Comilla and Bhola and Mehendiganj thanas in northern Barisal district all conform to the pattern predicted on the Delbecq-Delphi map and on the mental

maps.

The newspaper reports also provide support for the Delbecq-Delphi map where it is in conflict with the mental maps. They note famine conditions during 1974-75 in Satkira subdivision and in both Bagerhat and Kachua thana in Khulna, as well as in many of the coastal thanas of Chittagong district and in Nawabganj subdivision of Rajshahi district. The newspaper reports also confirm Kotwali and Kishorganj thanas in Mymensing District to be famine prone.

There are, in fact, only three discrepancies between the newspaper reports of famine and the pattern of potential famine vulnerability shown on the Delbecq-Delphi map. The newspaper reported famine conditions on Sandwip Island, in Kushtia district and in Joypurhat thana in Bogra district while none of these areas is specified on the Delbecq-Delphi map. Clearly, these areas should be examined further, but the problem of area scale referred to earlier may be pertinent because the shading of the four thanas in Chuadanga subdivision in Kushtia district was based on a famine report mentioning only two thanas in Chuadanga Subdivision.

3. Comparison of the Delbecq-Delphi Map with the Map of Origin of Bustee Dwellers of Dacca City.

Between 15th March and 15th May 1974, Sayeda Rowshan Qadir and the staff of the local government Institute conducted a sample survey of 200 bastuhara or homeless households living in three of the bustee or squatter areas of Dacca City (Qadir, 1974). The selected bustees, Babupura, Nayapaltan

and Lalmatia, were chosen to represent "large, medium and small sized bustees in different localities of the city". Qadir describes the findings from the sample survey of the origin of the bustee people in Dacca City thus:

> *"Although people came from as many as 10 thanas of Faridpur, 11 thanas of Barisal, 12 thanas of Dacca, 10 thanas of Comilla and 5 thanas of Noakhali, major influx occurred from only a few thanas. These were Munshiganj, Tungibari and Lauhaganj in Dacca, accounting for 61%; Naria, Janjira, bhedarganj, Palong, Shibchar and Goshairhat in Faridpur accounting for 87%; Hijla and Borhanuddin in Barisal accounting for 68%; Daudkandi and Muradnagar in Comilla accounting for 73% of the respective district's total migration to the three bustees. Almost all these thanas are found to be riverine which are subject to breaches and flood."*

Qadir, 1974. (See Figure 6i)

Different bustees in Dacca City drew from different catchment areas, and these results only show the origin of bastuharas from within the Dacca catchment area. Data on the origin of bustee dwellers in Chittagong and Khulna, although published, were not available. Neither does the distribution plotted by Qadir's group directly show the migration generated by the 1974-75 famine, because it was taken prior to the famine crisis period (See Section 2 Figure 2 iv). Assuming however, that famine-induced migration is merely a sudden acceleration of normal out-migration patterns from vulnerable areas, Qadir's map of the origins of bastuharas within the Dacca catchment area certainly corroborates the pattern of the Delbecq-Delphi map, particularly for the concentration of dots on the river bank of Madaripur subdivision, Faridpur, and Hizla thanas in northern Barisal. The aggregate pattern

in Kasba, Muradnagar, Homna, Daudkandi and Debiduar, along the Gumti river in northern Comilla confirms the Delbecq-Delphi map pattern. (The mental maps did not demarcate any areas in northern Comilla).

4. Comparison of the Delbecq-Delphi Map with the Famine Survey of Ten Thanas, 1975.

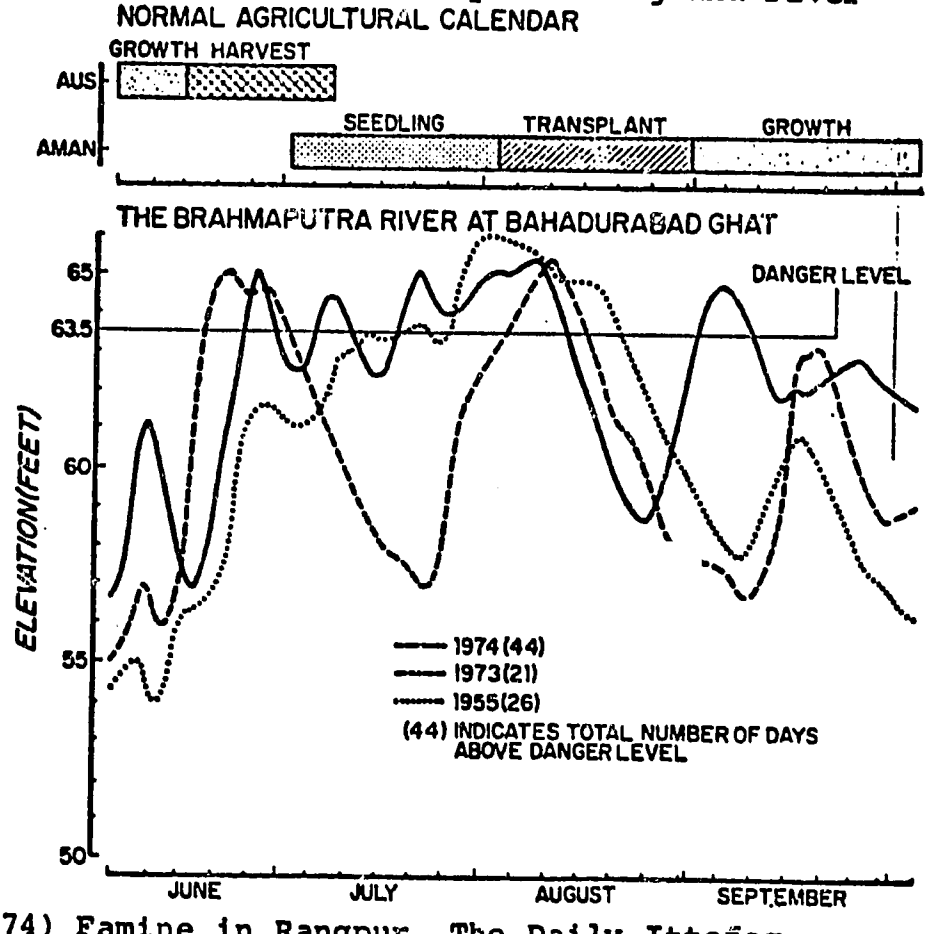
(a) Gathering Data from a Famine Survey:

Unfortunately, it was not possible to conduct a control study to differentiate the severity of famine symptoms in areas very liable to famine and areas not classified as being liable to famine. It was however, possible to compare differences among thanas in an area which was classified on the Delbecq-Delphi map as being liable to famine, which was recorded as exhibiting severe symptoms of famine in the national newspapers and which was declared to be a famine area by the Government of Bangladesh in 1974-75.

The Government of Bangladesh, Ministry of Health gave the researcher permission to carry out a survey of famine symptoms in a 1300 sq.mile area of northern Bangladesh in May and June 1975, after the famine symptoms had begun to decline. As we shall see later after describing the results of this survey of famine sumptoms in different thanas , it was not possible to correlate the intensity of famine symptoms with the Delbecq-Delphi Index of Famine Liability in the same local areas. The famine survey covered 10 thanas: nine thanas of eastern Rangpur (Nageswari, Kurigram, Ulipur, Chilmari, Rowmari, Sunderganj, Gaibandha, Fulchari and Shaghatta) and Dewanganj thana in north-west

Mymensingh. These 10 thanas lay athwart the Brahmaputra River for the first 60 miles of its flow through Bangladesh, after entering from Assam in India.

Although Akbar (1974) has described the famine in that area as being primarily induced bysuch "man-made" causes, the political unrest in the area following liberation and the magnitude of grain and jute smuggling that occurred across the international border in 1974, the evidence overleaf suggests rather that the predominant causes of the severity of symptoms in this particular area were untimely flooding and river erosion.



1 Ittefag (1974) Famine in Rangpur, The Daily Ittefag. Thursday, October 24th, Page 1, Cols. 2, 3 and 4.

The 1974 flooding of the Brahmaptra was more damaging than the famous flood of 1955. Although in 1974 the flood peak was 0.5 feet lower than in 1955, Figure 6ii, illustrates the greater destructive power of the flood in 1974 in the Eastern Rangpur area. It was above danger level[1] for 44 days compared with only 26 days in 1955: there were also six steeply rising flood peaks in 1974, not one slow rise as in 1955. Meshing the hydrographs with the local agricultural calendar above, it can be seen that the first peak in 1974 rose early and very rapidly in late June to interfere with the aus (summer rice) harvest and the last flood peak came as late as September when the aman (winter rice) is normally past both the seedling and transplant stage, and into the growth part of the cycle. Similarly the hydrograph from the Tista, the major tributary from the Himalayan foreland which joins the Brahmaputra in the area at Chilmari, indicates that the flood waters never crossed the danger level in 1955, but in 1974 they rose above the danger level for 29 days.

With these extensive high flood levels, bank line migration averaging 1000 ft. westwards on the eroding right bank in one flood season, may be inferred from recent work on channel processes of the Brahmaputra (Coleman, 1969). This massive river erosion is seen in the photomap Figure 6iii and was substantiated by reports from local officials. Such an abnormal erosion rate along the 60 miles of the Brahmaputra

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[1] The concept of "danger level" (bankful level, plus six inches) is ambiguous in Bangladesh where left and right banks vary greatly in elevation. At any recording station, however, the given danger level is taken to be relatively stable over time.

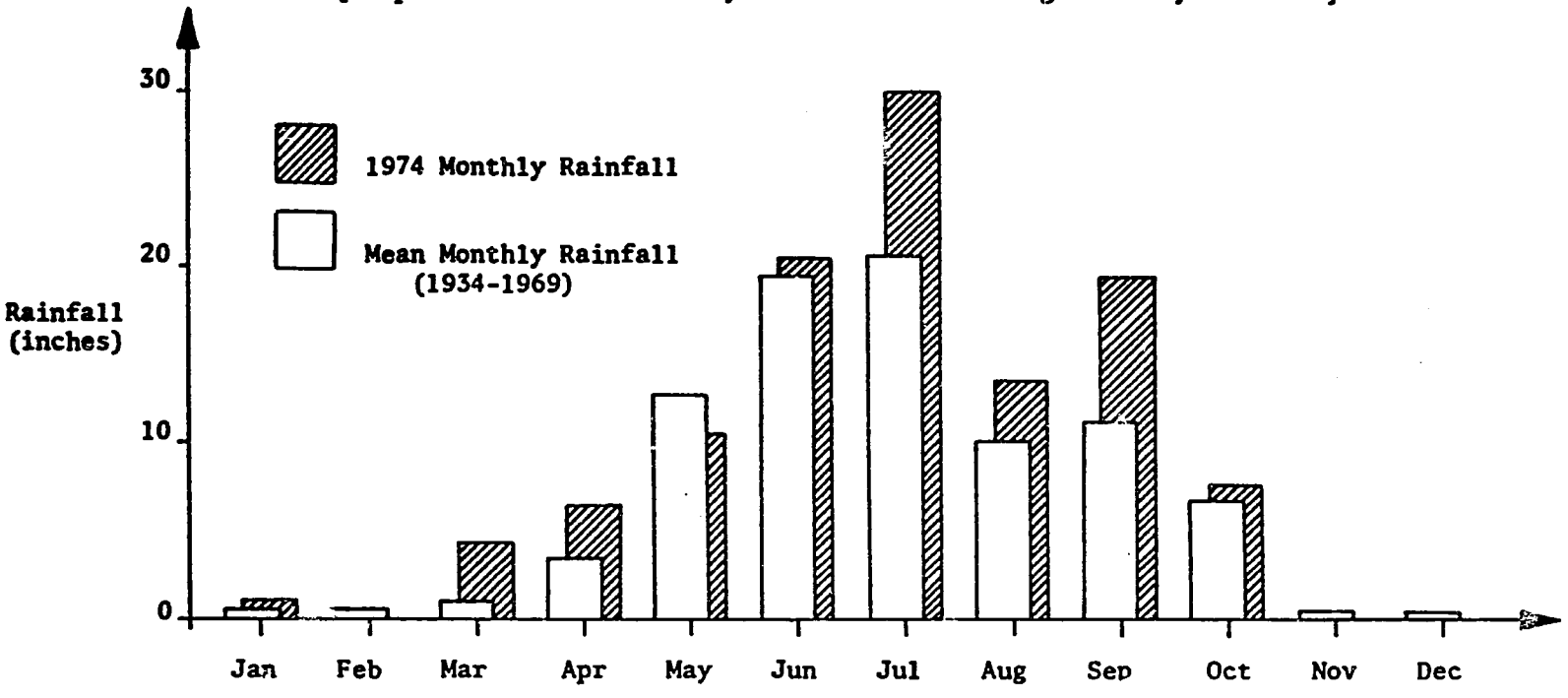
in the sample area alone, where riverine population densities reach 2000 per square mile, would have suddenly imposed over 24,000 people without homes or lands on the already run-down rural infrastructure between June and October 1974.

Concurrent with this extensive erosion of the right bank occurred the deposition of sterile sand on the left bank, abnormally high rainfall within the area (Figure 6iv) and ponding of the late flood water by water hyacinth (Pontederia crassipes).

Apart from this circumstantial evidence, my contention that environmental factors rather than smuggling predisposed this particular area to famine in 1974-75 is reinforced by an article by Amrita Rangaswami (1975), which documents congruent famine symptoms in the same riverine environment but further upstream, around Gauhati on the Indian side of the international border. Certainly many of the factors associated with the famine in Eastern Rangpur in 1974-75 were man-made (see Figure 6v), but the reasons that Eastern Rangpur area was worst affected were predominantly environmental. It should also be noted that in this area where famine symptoms were recorded, or no time was there no rice in the subdivisional markets (Figure 6vi), and in the thana later found to be most severely affected, Rowmari, it was reported that the rice price did not even rise (Abed; 1976).

STATION RANGPUR: (25° 45' N., 89° 15' E.) Elevation 112ft.

[Comparison of 1974 Monthly Rainfall with Average Monthly Rainfall]



Note:- Rainfall in July 1974 = 30". This has a probability of 0.05, i.e. once in 20 years.

Figure 8

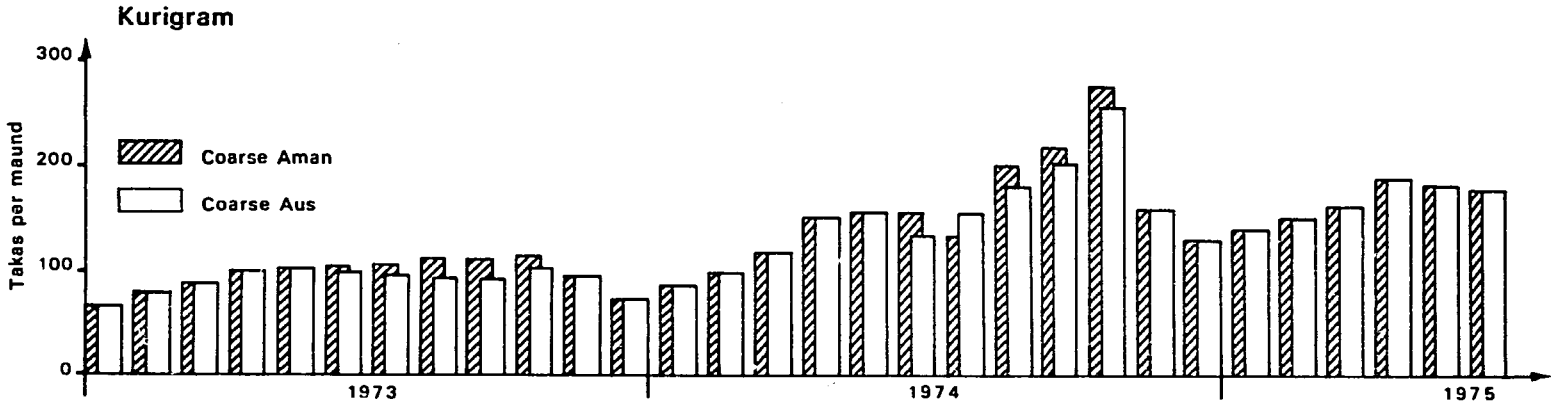
	International	Na ional	Regional	Household
Normal Conditions		High % of rural population landless High % below subsistence level Administrative unpreparedness Post-war dislocation of transport Shortage of food storage capacity Shortage of rolling stock Impared and insufficient river transport Unemployment and underemployment	Isolation and inaccessability Vulnerable crop pattern Flooding River erosion Burial by sediment Inadequate drainage and irrigation Shortage of storage facilities	Shortage of storage facilities Position within bari kinship pattern Position in the village structure Indebtedness and lack of savings Excessive outlay on social activities High proportion of small holdings Long continued malnutrition
Strain on Normal Conditions	Depletion of foreign exchange reserves Rise in world oil prices Loss of credibility with aid givers Panic on international grain market Possible environmental changes in the Ganges-Brahmaputra basin Carryover effect of returning war refugees	Breakdown of traditional social structure Smuggling Hoarding Profiteering Irregularities in the rationing system Lack of confidence and speculation Misappropriation of aid Failure of procurement policy Terrorist activities Crop failures in 1972 and 1973 Complacency over 1973 bumber crops	Population pressure especially in vulnerable char areas through in migration Several years of recurrent flooding Increased smuggling in a border area Continued westward migration of the Brahmaputra	Underemployment and unemployment Labour exploitation: energy loss without increased purchasing power Functional weakening of joint family as an economic unit Inability to buy amidst rising prices
Disruption			1974 flooding: rapidly rising, with early multiple and late peaks 1974 accelerated bank erosion 1974 sediment dumping Outbreaks of diarrhoea and dysentery Lack of labour demand due to crop, seed, cattle and fertilizer losses	Irrational crisis desire for rice Migration in search of food Eating of abnormal foodstuffs Linkages in nuclear family change to linear linkages – e.g. weakling child – grandmother,

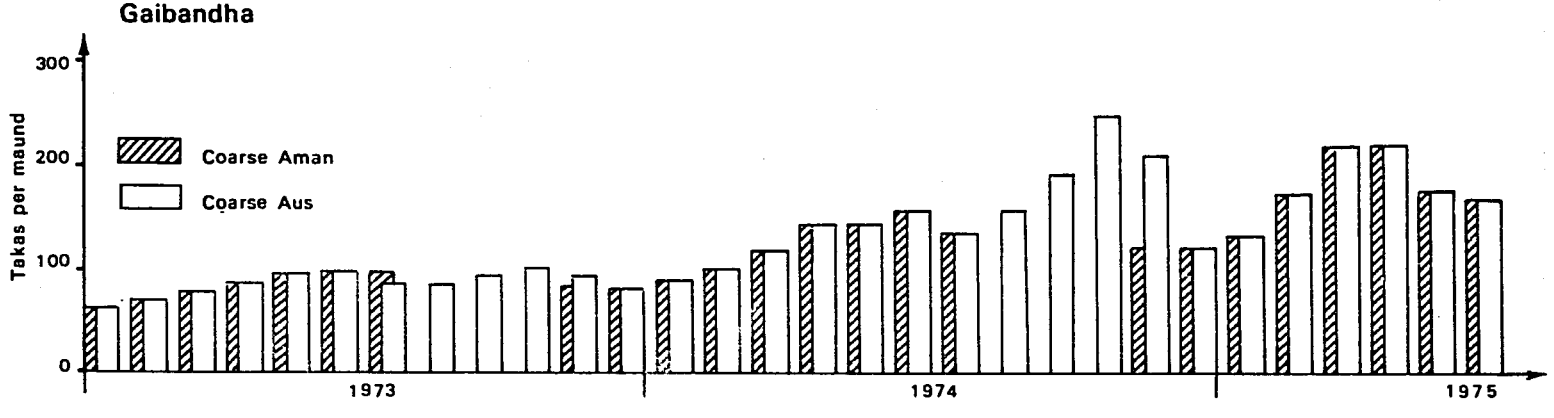
Figure 6v

The area of Eastern Rangpur affected by the famine had a total population of 311, 257 households (1,836, 415 individuals in 10 thanas. The famine survey was designed to include 800 households (4720 individuals). Although the total sample of 800 households was large, the sample size for each thana was small, because funds were limited and also because it was necessary to complete the survey of all ten thanas before the break of the monsoon in mid-June'75.The 800 households were selected equally from each of the ten thanas providing 80 households per thana. The 80 households were then selected from four villages, using a "probability proportional to size" sampling framework to ensure that each household had an equal chance of being chosen, whether it was in a large or small village. All the households and the villages in the ten thanas, or more specifically the mouzas (revenue villages), were stratified in order to include a representative proportion of households in villages that were recorded by the Subdivisional Officer (Relief), as being severely affected by the 1974 flooding Within each mouza, household numbers were systematically selected from the list and a map of the household malaria numbers, while maintaining a modulus of N/n (N was the total number of households in the village and n was the number of households to be sampled), in order to ensure a total coverage of all households in the village. If any household had moved, the whither, why and when of the move was noted, and the next malaria household number was chosen in lieu of the missing household. Although there were no household refusals, loss, wasted forms and illegibility meant that only 790 of the 800

MARKET PRICE OF RICE BY MONTH

(AS REPORTED BY THE SUBDIVISIONAL MARKETING DEPARTMENT)





*Note: the absence of aman rice at the critical period in late 1974 in the price records of Gaibandha

Figure 9.

household questionnaires were available for analysis. In no case did the number of households analysed fall below 78 out of 80 in a thana.

Each of the four survey teams consisted of two members, one of whom was from the Rangpur area. It was arranged for the teams to be introduced to the ovi bhabok (household head), by the village malaria officer. They were introduced as a "survey team from UNICEF". The mention of UNICEF undoubtedly helped the rapport between the members of the survey team and those surveyed,because UNICEF's tubewell program for improving drinking water was fully acknowledged by the population. However, knowledge that the team were associated with an aid-giving organisation may have biased respondents replies so that symptoms of distress were exaggerated. In 65 percent of the cases the household head was available and answered the questions in a relaxed atmosphere, sitting around on piris (low stools) or chairs outside the bari (house) compund, offering the interviewers koler pani and am (cool water from tubewells and mangoes), and themselves often drawing on the hookah in between responses. If an answer was slow in coming onlookers would volunteer. In the 35 percent of occasions when the household head was not available, another family member or neighbour would automatically present himself or herself. Fifty-seven percent of the respondents were women, and the purdah system normally required that they be interviewed with the help of a male intermediary repeating the questions through the side of the hut to an invisible respondent.

The interviewers administered a questionnaire (see Appendix E and Figure 6vii) and recorded anthropometric measurements on all available children in the household aged between 2 and 10 years[1].

This survey of famine symptoms was implemented only after careful standardization of the field methods. The questionnaires were initially pretested in a village north of Dacca, and then completely revised after a pilot survey in Sankardah village, a char island in the center of the Tista River[2]. The anthropometric measurement scales were standardized against other ongoing nutrition surveys in Bangladesh, e.g. The Bangladesh Nutrition Survey. For the weighting and heighting, the weighing scales were standardized against a beam scale in the Cholera Research Laboratory, Dacca, and then standardized daily against each other. The four persons involved in measuring the weights and heights were initially trained in Dacca and then later their measurements were checked against each other on 25 children in the field prior to beginning the actual survey. The standardization procedure gave unanimous agreement to the nearest 0.1 kilogram on weight and

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[1]Age being diffcult to ascertain beyond the age of four, 130 cms and 25 kg were taken as upper limits equivalent to age 10. Age was determined by first standing all the children in line in ascending height. A local historical calendar was then used to calculate ages, proceeding from the shortest to the tallest.

[2]By definition survey conditions are different in a famine area, (See Section 4).

FIELD METHODS

THE TEAM

WEIGHING

HEIGHTING

INTERVIEWING

the nearest 0.1 cm. on the height. There was only one exception: a child was found by one measure to weigh 0.2 kgs. less than the weight determined by the other three measurers. This was later found to be caused by an unrecorded urination in the interim. All children were measured barefoot wearing only a sari or lungi, and any "knots" of food or other material in the garment were carefully removed.

Although the evaluation is primarily concerned with areal variations, a description of the "average household" in the survey may help lead in to understanding some of these differences. The households, identified by all those on the malaria card at a particular malaria number, were normally an agnatically related family of 5.9 members, who shared the same cooking fire. Sometimes there might only be one household member, but households with as many as 18 members were recorded. Of the total, 719 (91 percent) households were Muslim. The remaining 71 households (9 percent) were Hindu. None of the sample households was Buddhist or Christian. The head of the household was normally (93 percent) a male, married (85 percent) and usually claimed to be an owner cultivator (43 percent): Some (28 percent) were cultivators and a few (5.3 percent) were businessmen. Despite the riverine location only 2.4 percent were fishermen. Servants made up another 2.2. percent of the primary occupations. The old, the disabled, the unemployed and the beggars made up a further 7.7 percent. Twenty-five percent of the household heads had a secondary occupation, augmenting their primary income by cultivating

their own land (10.1 percent), labouring on someone else's land (8.4 percent), doing business (2.7 percent), fishing (0.4 percent) and begging (0.9 percent).

Each household's wealth, or its lack thereof, was bound up in its land. The average acreage per household was only 1.15 acres at the time of the survey compared with the Bangladesh average of about 3 acres (Tyers 1978). Only 7.7 percent of the households claimed to have more than 5 acres and 36 percent had no land at all. The cattle and ploughs necessary for tilling the land were similarly scarce. Although nine of the households had 8 cattle at the time of the survey, the average number of cattle per household was 1.2, and 52 percent of the households had no cattle at all. Similarly 53 percent of the households did not have a plough. Goats are the alternate to cattle for sacrifice in hard times. but 81 percent of the households did not have a goat. The average number of goats per household was only 0.33, or one goat between three households. Corrugated-iron roofs are often a sign of wealth and status, but only 20 percent of the houses boasted such roofs, the remainder had thatch roofs and in some cases even those had been sold. With few possessions, migration was relatively easy, but trade and relief to revitalise the area were limited since only 8 percent of the households had either a cart or a boat.

During the nine or ten months between the end of the last flood in September '74 and the begining of the survey, households had been selling off their possessions to raise their purchasing power. On average each household had sold 0.8 acres of land. In some thanas the land registry office showed that over 1000

acres had been officially transferred in a single month in early 1975. This did not include the unofficial sales and mortgaging that undoubtedly occurred. In the same period 35 percent of the households had sold off some of their cattle. Each of the households had lost 0.6 cattle within 10 months, i.e. 33.33 percent of their cattle had been sold. Although only 13 percent of the households had sold off goats, the average household loss of .26 goats meant that 44 percent of the goat population had been sold. Less than 1 percent of the households sold off their ploughs or their cart or boat, but in the case of the carts and boats this meant a 10 percent loss in overall numbers over the nine month period. With 5.1 percent of the households selling off their corrugated iron roofs, it appears that at least 20 percent of the richer households were also affected by the famine. Smaller items had also been sold: 6.1 percent of the households had sold off trees or wood, 9.4 percent had also sold off furniture, old carved wooden chairs, or perhaps their almari (wooden dresser) or the Shinduk (wooden chest) used to store their prized possessions, which may have included the malaria card. The women's ornaments, often given at the time of marriage as a form of insurance, had been sold off by 16.2 percent of the households. The most sensitive indicator of famine-induced selling seemed to be the household utensils e.g. haripatil (cooking pots), thala (brass plates), chamuch (brass cooking spoons), kashar gelash (brass drinking vessels) and bodna (toilet jugs).

Twenty six percent of the households were recorded as having sold such household utensils.

Household food habits and nutritional status had also changed. Even at the time of the survey in May-June 1975, when the acute famine crisis was declining, 519 or 66 percent of the 790 households were still eating less than 1 rice meal per day, which is in sharp contrast to the "normal" three rice meals per day in rural Bangladesh. During the peak famine period, from September 1974 to March 1975, the population had resorted to eating alternative "famine food-stuffs" which though ubiquitous, are considered unacceptable in normal times, e.g., thor (the hard external trunk of the plaintain sapling, musa paradisica), and bonn kochu or wild arum (Araceae supp) wheat gruels,khichuris, rice husks, leaves, and even fen (starchy water drained after the rice is cooked.) Of the 790 households, 450 were eating the plaintain trunk during the peak famine period, but by the time of the survey this number had dropped to 50. Similarly the number of sample households eating bonn kochu over the same period had dropped from 325 to 125. The results of the short term decline of the calorific intake were revealed in weight for height data. Anthropometric measurement detected 19 percent of the children aged between 2 and 10 as being below 80 percent of the normal weight for height (Harvard Standards, Stuart and Stevenson) i.e., severely malnourished. This was severe compared with Bangladesh "norm" established by the 1966 Nutrition Survey of about 5 percent being severely malnourished. It was low,

however, compared with two other nutrition surveys in one thana (Rowmari) during the peak of the famine. One of those surveys was a QUAC stick survey and the other was a weight for height survey using Harvard Standards. Both reported that 38 percent of the children at that time were severely malnourished. Although the low weight for height data at the time of the later survey were probably the results of a temporary famine, the weight for age figures showing 33 percent of the children between the ages of 2 and 10 being below 60 percent of the International Weight for Age Standard. This suggests long term nutritional deprivation in the area.

Households were unable to purchase and consume sufficient food. This dietary deficiency was coupled with the increased prevalence of diarrhoeal disease, particularly shigella shiga observed by smallpox doctors in the area and evidenced by overtly prolapsed rectums on several children. Together malnutrition and disease in the area increased the crude death rate to 49 per thousand. If this high death had indeed lasted for a whole year, it would have meant that the famine had been associated with 55,000 excess deaths within the survey area. The assumption is unlikely, however, as the death rate appears to have peaked in the four months between September and December, so the computation of a yearly rate from the nine month survey data is invalid. Just as the death rate increased, so the crude birth rate showed a response to the physical stress in the area, by falling to 27 per thousand for the year. This was the same as the figure for the Matlab field trial area during that year (see Figure Iv).

Some households opted to move, either in toto or in part. Assuming that the updating of the village malaria maps in mid 1973 was accurate, 21 percent of households in the area had moved in toto in the two year period before the mid 1975 famine survey.Sixty eight percent of those household moves were reported as being in search of food and work, i.e. a response to famine, as opposed to the 32 percent who migrated to a safer place for settlement and work presumably as a response to flood. During the nine months between the end of the flooding in September 1974 and the survey in mid 1975., only 2 percent of the individuals in the total population had migrated, suggesting that famine-induced migration in the area generally means the movement of the whole households rather than individuals.

Relief operations in the survey area had been intensive. Thirty-three percent of the households surveyed had had a member working on "test relief".[1] Remembering that traditionally famine was officially declared when 0.5 percent of the population was found to be consistently working on the test relief projects (Bengal Famine Code), this figure is indeed large. Forty percent of the households had had a member attending gruel kitchens to receive cooked food. Almost half the households (46 percent) stated that they had received "food aid", but further questioning revealed that they

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[1] Test relief used to involve the provision of public works at depressed wage levels to "test" how many people were willing to work for how long at such a low rate.

had received only one allocation in most cases.

(b) Differentiating Thanas Liable to Famine.

Syndromes, with many symptoms,like famine are intrinsically difficult to quantify and hence to compare. Can we really say that a certain area, in this case a thana, was more affected than another thana? Which symptoms should be chosen to measure the intensity? Should some symptoms be weighted more than other symptoms? Just as it was tempting to toss all the components of famine vulnerabulity into a factor analysis programme, and then use only the components which the computer returned with a high factor score, so it is tempting to factor analyse the famine symptoms. Before abbrogating total responsibility in this case, however, it may again be more appropriate to select the most appropriate symptoms, using the best judgement available, in this case the researcher's experience throughout the famine survey area. Each of the areas or thanas may be ranked for each of the symptoms, portrayed together, graphically and then the total collage interpreted by the researcher in the light of the known facts. I consider that in a situation where so little is known about the causal relations between the symptoms, that this is the best available method.

I have chosen eight symptoms, as a manageable number easily portrayed graphically, to represent the famine status in each of the ten thanas surveyed. I have had to omit several symptoms of the famine syndrome (Chapter 1) for want of information, i.e., crime, begging, borrowing, unsanitary conditions and disease. Some of these, e.g., crime and begging, might not occur within the area where the famines are generated. Also I have omitted certain symptoms e.g., a decline in the number of births, or the selling off of trees and wood, for want of a sufficiently large sample size to detect significant differences between thanas. The eight chosen symptoms are thus:

A. Percent of Households selling Household utensils: Haripatil (commonly household utensils) are not normally sold. They remain in the household from generation to generation. In times of crisis, however, the metal utensils offer small easily saleable items which are often replaceable by cheap pottery or wooden ware. Households can raise money by selling their thala (large heavy plates) and basun (smaller plates) which may be brass or enamel. Similarly the chamuch (brass cooking spoons) and handi (cooking pots) are sold together with the katari (heavy chopping blade) and the chota (gridle). Even the kolshi (large water pot) and the lota or badna (toilet jugs) and the kashar gelash (brass drinking vessels) may be dispensed with to raise the household purchasing capacity. Although the different religious groups may have had different types of utensils (Aziz, 1976),

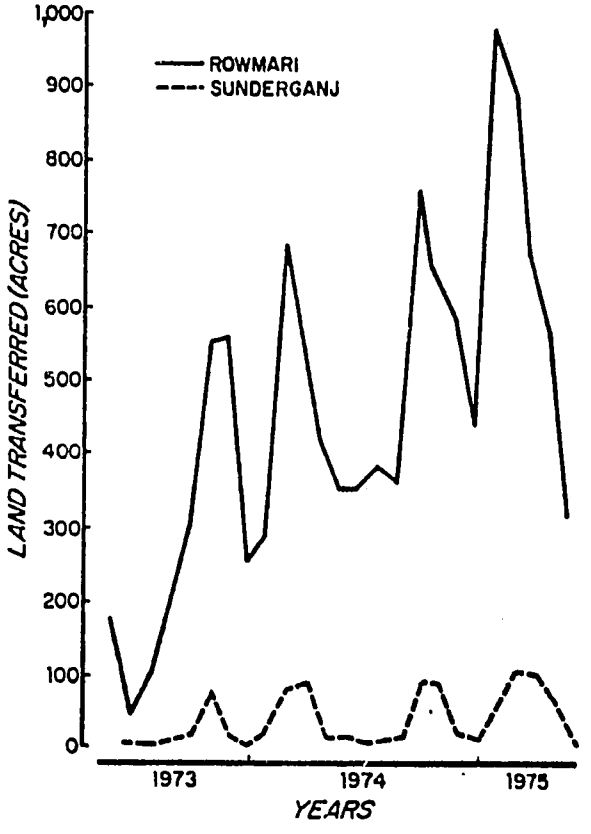
e.g., the Hindus may have had a higher proportion of brassware, nevertheless there was no significant difference (p=0.93) in the proportion of Hindu households selling off utensils, compared with the Muslim households. Although household utensils are items of relatively little value, they still reflect the suggestion (earlier.) that famine symptoms may not necessarily be most visible among the poorest. Thus the axiom that you have to "have" before you can "sell" off lessens the resilience of the poor, while the rich having greater means of storage and savings are not forced to sell so much. It was not only among the landless that the percentage of households selling off their utensils was very high. Twenty-nine percent of the households who had been landless before the famine sold certainly off their houshold utensils, but the figure was even slightly higher for the households who had between zero and two acres of land, before the famine. The percent selling utensils dropped to only 18 percent for households owning between two and five acres of land, and it fell even lower, to 7 percent, for households owning more than five acres of land before the famine, (p=0.00).

This same principle that those who <u>show</u> greatest loss are the poor, but not the poorest was reflected when the pattern of utensil sales was compared against the primary occupation of the household head, (p=0.00). Only 18.2 percent of the households headed by beggars, who perhaps had only one aluminium bowl for holding <u>poisha</u> (coins) sold off

their utensils. Households headed by landless labourers, servants and fishermen, with few other forms of dispensable savings, had higher proportions selling off their utensils: 37.4 percent, 57.1 percent and 57.9 percent respectively. Those headed by businessmen, although probably richer, still had significantly less land, (p=0.00), hence fewer savings options and 31 percent of them had to sell their utensils. Only 16.7 percent of the households headed by owner cultivators, however, needed to sell their utensils.

B. Percent of Average Household Acreage Lost: In Bangladesh, a man's land is his wealth. Real wealth is in paddy land, (cf. Mahalanobis Survey, 1944), but in this study, figures were gathered only for the total land area. No attempt was made to record the quality of land or the number of crops per year. The loss of land in an area like eastern Rangpur, where all but a small minority of the civilian labour force are employed in agriculture, not only means increased dependency on the remaining landholding households for work, but it also means fewer degrees of freedom to rent to others or mortgage or sell that land in later times of need.

In some thanas the acreage of officially registered land sales at the thana registry offices showed increases of up to ten times during the famine period from September 1974 to March 1975, compared with the transactions during the twelve prceeding months. Some thanas in the survey area showed much larger increases than others, (e.g., Figure 6viii). The more credible figures recorded by the sample survey at the household level also revealed large scale transfers of land and



Seasonal sales of land over two years in the Bangladesh *thanas* of Sunderganj and Rowmari.

Figure 6viii.

Occupation of Household Head	Households Without Deaths	Households With Deaths	Households With Deaths (%)
Cultivator	306	37	10.8
Labourer	179	43	19.4
Businessman	39	3	7.1
Fisherman	17	2	10.5
Servant	12	5	29.4
Teacher	6	1	14.3
Beggar	14	8	36.4
Carpenter	4	0	0.0
Housework	15	6	29.0
Old or Disabled	31	7	18.4
Tailor	5	0	0.0
Priest or Imam	3	1	25.0
Self Profession	19	1	5.0
Self Employed	16	2	11.1
Unemployed	1	0	0.0
Others	4	1	20.0
Total	671	117	
% Total	85.2	14.3	

Chi Square = 28.644 with 15 Degrees of Freedom
Significance = 0.017

Table 6viii

This same increase in the percent of households selling land, as their original land holding sizes decreased, is seen with the small sales of land between one-tenth and two-tenth acres. This pattern of increasing sales is obscured for sales above two tenth acres. Indeed sales of land areas over three-tenths of an acre show an almost uniform pattern: 32 percent and 34 percent among households formerly having small, medium and large land holdings respectively. These larger sales may not have been famine induced, but rather a response to other market forces, e.g., land prices may have risen despite the glut as happened in the 1943 famine, (of Mahalanobis, 1946).

Following the pattern of household utensil sales, there was no significant difference in the proportions of Muslim or Hindu households selling land. However, it was interesting to note that all the Hindu households selling land, sold it to buy food, and unlike some of the Muslim households, none sold it to buy better land elsewhere, possibly suggesting either the reluctance or the difficulty for Hindus investing elsewhere in land in Bangladesh.

Percentage of Households Selling Land over the famine period.

	0-0.09 acres	0.10-0.19 acres
Cultivator as household head (N=343)	3	18
Labourer as household head (N=222)	9	16

The sale of the small amounts of land, i.e., 0-0.09 and 0.10 - 0.19 acres followed the same pattern as that of the sales of household utensils, when compared between households headed by cultivators and those headed by labourers. Tests confirm that the percent of households headed by labourers, and selling off land was consistently higher than that for households headed by cultivators in both the 0-0.9 acres and 0.10-0.19 acre sales. This confirms that the labourers are not only most susceptible to famine, having small land plots initially, but that they are also the most severely affected, leaving them in an even more vulnerable position should another famine occur.

The percentage of household land acreage lost was selected as an indicator of famine severity because it does indicate rural impoverishment and had been used in past famine surveys (Mukherjee, 1947; Mahalanobis, 1946), but as an indicator it masks many other confounding variables.

C. <u>Percent Increase in the Number of Landless Labourers</u>: Land sales alone do not indicate whether those selling have sold all or only part of their land. Landlessness has been used here to mean, households with no land holding. These households are totally dependent on employment and hence food supply, from others. They are thus the first groups to suffer in times of economic depression, unless they have other income sources, e.g., fishing. The percentage of landless households in the survey area increased from 27.7 percent to 35.9 percent between September 1974 and May-June 1975. This increase in landlessness was almost entirely

(97 percent) from those households that had previously owned less than two acres of land.

The occupations of household heads featuring the greatest change towards landlessness were those with skills, e.g., tailors (40 percent), carpenters (25 percent) and teachers (14 percent). Households headed by a labourer suffered more than households headed by owner cultivators: 17.1 percent of the labourers became landless. It is interesting to note that even households having businessmen and servants as the household heads: i.e., those presumably with ties in the urban areas, suffered as well, with 11 percent of each category becoming landless.

D. Percent Eating Less than One Rice Meal per Day: Despite efforts to introduce wheat,particularly in north Bengal, and the prevalence of other alternatives, e.g., china kaon or pearl millet (Pennisetum glaucum) in some of the study char (newly emerged riverine land) areas, rice is nevertheless the staple crop. Old people sometimes appeared psychologically unable to digest wheat even when dying from starvation, so accustomed are they to rice. The rural Bangladesh norm of three rice meals per day, usually garnished with some protein in the form of beef, goat, chicken, prawn or fish, with a vegetable curry is probably a stereotype rather than a norm today. Although the famine survey was conducted after the acute famine crisis was over, there were still more than 500 of the 790 households that were eating less than 1 rice meal per day.

The number of rice meals that households were eating at the time of the famine survey rose consistently when compared with the acreage of the household after the 1974 flood and before the famine began. Ninety percent of the households who had held no land before the famine, were eating less than 1 rice meal per day, in May-June 1975. The percentage of households eating less than one rice meal per day fell to 70 percent for those who had owned 0-2 acres, to 44 percent for those who owned 2-5 acres and to 20 percent for households that owned over 5 acres of land.

The occupation of the household heads in the few households that were still eating three or more rice meals each day was invariably an "owner cultivator". Only 46 percent of the households headed by "owner cultivators" were eating a rice meal less than once a day. This percentage significantly different (p=0.0) from that of the households headed by labourers (95.6 percent) or fishermen (90 percent). All (100 percent) of the households headed by servants and beggars were eating less than 1 rice meal per day.

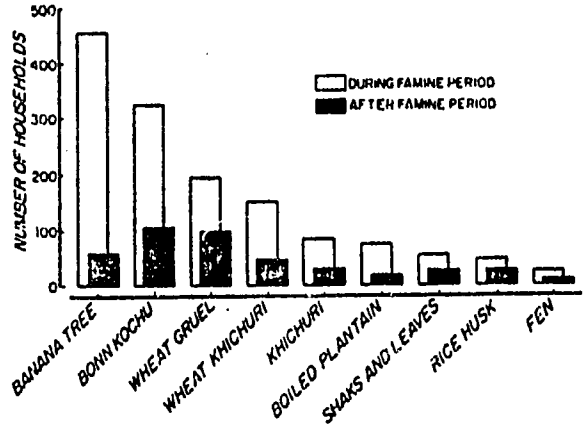
This indicator seems to reflect socio-economic status as well, but it may be clouded by differences in the quality of rice intake, the availability of other staples or lack of rice in certain areas, the varying definitions of "a rice meal" and the possibility of relief doles confounding the picture presented by the indicator.

E. <u>Percent of Households Eating bonn kochu (wild arum) between 1st Ramzan and the Bengali New Year:</u> Foods which were both non-seasonal and unacceptable in the normal

times (see Figure 6ix) exhibited different consumption patterns between the famine period (September 1974 to March 1975) and the period after the famine, (March 1975 to May-June 1975). Although the intake of plantain saplings (banana trees) appeared to be most sensitive to famine conditions which 460 households using it as a food during the famine period, compared with only 60 households after the famine period, bonn kochu (wild arum, araceae spp) was chosen as a famine indicator because it was free from the difficulties of definition associated with the banana tree and also because its intake was only slightly less sensitive to famine conditions than that of the plantain sapling. If someone is eating any part of the bonn-kochu as opposed to the man kochu or the pani kochu (all araceae spp.), they are eating a famine food, one that lacerates the interior of the mouth. Although those eating the hard trunk of the plantain are also eating a famine food, some people consume the softer interior parts of the trunk as a delicacy even in normal times.

F. Percent of Children Aged Between 2 and 10 Less than 80 percent of the Weight for Height Standards (Harvard):

Short term "wasting" as opposed to long term "stunting" has efficiently been measured by comparing the weight against the height of people in a disaster affected population (Waterflow, 1973). Children (i.e. persons less than 10 years of age) are normally the most sensitive nutritional group during a famine and children aged 2-10 were chosen, because it was assumed that a high proportion of the children less than 2 were still benefitting from breast feeding. Because of the



Alternative foodstuffs during times of famine in North Bengal.

Figure 6ix

difficulties, in assessing age above about 4 to 5 years in Bangladesh, children above 10 were equated with those weighing more than 25 kgs. or measuring higher than 120 cms. The weight-height ratios of males and females were then compared with the 50th percentile of the Harvard weight for height standards and males and females under 80 percent of their standard were considered to be severely malnourished.

Although this anthropometric indicator is the most objective in that direct measurements are made and no significant difference (p=0.0) was found between males and females, there are still limitations. Some children were absent; others refused to come out and be weighed and the latter may well have been the most malnourished segment. Also this indicator only told us the nutritional status of the children who were still alive and who had not left the village. The indicator is also sensitive to epidemic disease as well as to famine. Also an area may still be exhibiting many other famine symptoms, but low nutritional levels may have rebounded quickly after feeding programmes were introduced.

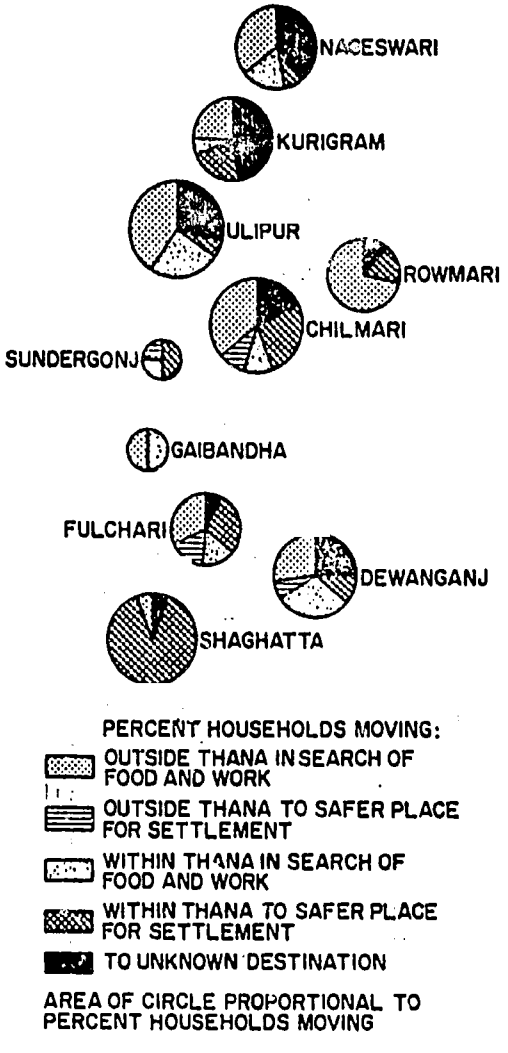
G. Percent of Households who Moved in Search of Food or Work Outside the Thana in the Past Two Years:

Households that had been listed on the updates of the malaria lists two years prior to the survey but were no longer visible were assumed to have moved. In 96 percent of the cases this was corroborated with the neighbours. Often the bhiti (raised earth floors) of the huts were still visible although grassed over. Banana trees or coconuts would also mark former household locations.

Neighbours were also able to say why, and approximately whither, households had moved.

Figure 6x shows that household migration was high for certain thanas, i.e., the area of the circles was large for Ulipur, Chilmari and Shaghatta. However closer inspection of the pie-graphs reveals that in a thana like Shaghatta, over 30 percent of the household migration was within the thana in search of a safer place to settle in. The migration was probably the result of extensive river erosion (see photomap Figure 6iii) which in the monsoon of 1974 was as much as a mile wide, forcing families to relocate in temporary bustee conditions on flood embankments or on land within the thana owned by relatives. The thana was therefore able to asborb this sudden unloading from one area to another. Households that had to move to a location outside the thana, in search of food and work were more likely to reflect famine symptoms since they suggested the inability of the locale to sustain them.

H. Percent of the Population Dying from "Causes" Recorded As Starvation or "Lack of Food": If out-migration has not occurred, death is the terminal symptom of famine. It indicates the community's inability to sustain community members Forty-seven percent of the 130 deaths in the famine survey area between September 1974 and May-June 1975 were reportedly caused by starvation or lack of food. Sixteen percent were ascribed to diarrhoea or cholera and 5 percent were thought to have been caused by dysentery. Fever, small-pox and others accounted for the remaining 32 percent. Deaths



Migration of households from settlements during floods in Bangladesh.

Figure .6x

in the area for those nine months were dominated by "starvation" and "starvation related" deaths.

These starvation related deaths were significantly higher, both in absolute numbers, and as a percentage of the surveyed population among the young and old. When the death rates in the famine area were compared with a normal nine-month period in 1967 in Matlab area (op. cit.) the increased rates were also seen to be among the young ((0-4) and (5-9)) and older age groups (above 40). The increased death rate appeared to be greatest amongst young and old males. The number of deaths documented in the famine survey that were ascribed to starvation appeared to be particularly high amongst the older men aged 50-59 and 60-69.

It was the poor households, ie., those with little or no land, who suffered the most severe mortality between the September 1974 famine and the survey in May-June 1975.

DEATHS

Amount of land before the famine	HH Without Deaths	HH With Deaths (%)	Row Total
None	167	52 (24%)	219 27.7%
Less than 2 Acres	306	43 (12%)	349 44.2%
2-5 Acres	135	14 (10%)	149 18.9%
Over 5 Acres	65	8 (11%)	72 9.2%
Column Total	673	117 (15%)	790 100.0%

Chi Square = 20.00952 with 4 degrees of freedom
Significance = 0.0005.

Table 6ii

Thus the relative risk of a household having a death or deaths during the famine period was over twice as great for households that had had no land as for households with 5 acres of land.

Similarly the relative risk of a household having a death or deaths during the famine was three and a half times greater if the household was headed by a beggar than if it was headed by an owner cultivator. Households headed by servants showed a relative risk 3 times as great as those headed by owner cultivators and the households headed by labourers were twice as susceptible to having a death or deaths during the famine as those headed by owner cultivators. Households headed by businessmen appeared to have a low relative risk.

These eight symptoms chosen to characterize famine in the survey area may have risen, peaked and declined at different times in different areas. The survey recorded their occurrence at different times or periods: some through measurement, others through past recall. All of them have limitations because the underlying processes which bring about famine are still little understood. Because of this the causal relationships among the variables is also poorly understood. Rather than mask such limitations in the form of factor scores on unknown factors, the eight indicators were ranked for each of the 10 thanas and portrayed cartographically in Figure 6xi. The polygonal graphs, a concept originally developed by the Program for International Development at Clark University (1976) show certain thanas to have

been more severely affected by many of the famine symptoms than were other thanas. None of the polygons have consistently equal radii. This portrays the lack of consistency among the indicators, i.e., segments indented in the shaded polygon suggest that that particular indicator fails to corroborate the severity of that symptom compared with other highly ranked indicators in the thana, e.g., the relatively low percentage of severely malnourished children in Rowmari. These inconsistencies have also been highlighted by the shading of deviant rankings for each indicator in each thana on the table accompanying the diagram.

The polygonal diagrams point out that three of the thanas, Rowmari, Fulchari and Chilmari were very severely affected on most of the symptoms. The concave segment on the Rowmari and Chilmari polygons corresponds to the low percent of children who were classified as severely malnourished. This is probably because of the anthropometric measurements were made in June 1975 after the famine, when the most malnourished members had died or migrated from two of the worst affected areas and after feeding programmes had been concentrated in these areas. Chilmari also ranked low on the indicators for both the eating of bonn kochu (wild arum) and starvation related mortality. The former might be caused by the availability of the feeding stations as substitutes or by all of the bonn kochu having been eaten by that time. The low rating on the mortality indicator may be associated with the location of a railway terminus in the center of the small thana i.e., relief may come in quickly by rail or individual

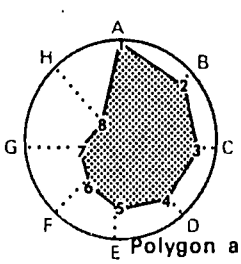
Indices of famine symptoms for the ten thana survey

(See explanation of letter codes below)

	A	B	C	D	E	F	G	H
Nageswari	16.9	7.2	3.8	39.7	35	15		19
Kurigram	24.7		9.0	56.4	34			
Ulipur		11.0		52.6	32	22	59	1.42
Chilmari			9.0	80.8			36	1.33
Rowmari	36.3	12.1	11.2	90.0	64		73	1.86
Sunderganj	25.0		7.5	58.8		18		0.44
Gaibandha	20.0	10.4		66.3	43		50	
Fulchari	31.3	12.3	8.8	86.3	42	23	31	1.53
Shaghatta	33.8	10.2		61.3	51	21		1.03
Dewanganj	17.9			64.1			29	

Famine symptom with an unusually high ranking compared with other symptoms in that thana

Famine symptom with an unusually low ranking compared with other symptoms in that thana



Polygon area 0.72(sq.ins.)

NOTE: A polygon is drawn for each of the ten thanas.

1,2,3....=Ranking of that thana for that famine symptom.

A. % of households selling their household utensils during the famine period.

B. % of land acreages lost by households during the famine period.

C. % increase in the number of landless households during the famine period.

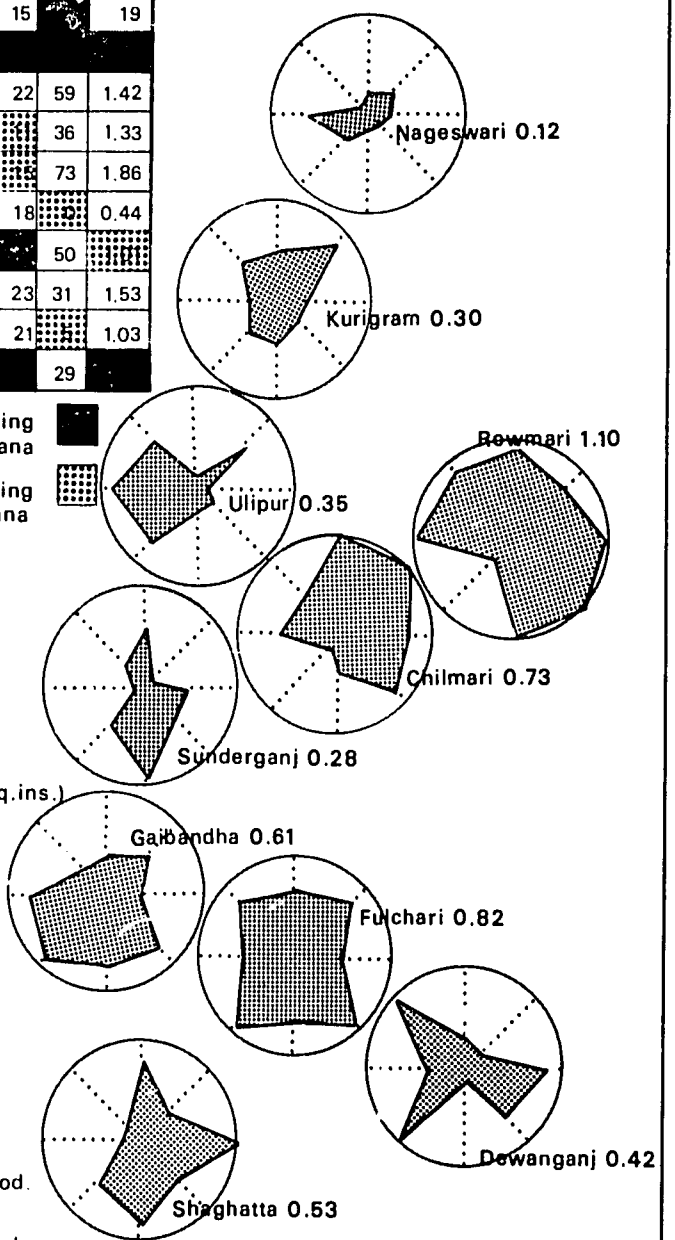
D. % of households eating one rice meal per day immediately after the peak famine period.

E. % of households eating bonn kochu immediately after the peak famine period.

F. % of children (aged 2-10) less than 80% of the standard (Harvard) weight for height immediately after the peak famine period.

G. % of households reported to have migrated outside their thana in search of food and work during the famine period.

H. % of mortality reported as being caused by 'starvation' or 'lack of food' during the famine period.



Bruce Currey

194

members of families may have "caught a ride" (often on the train roof) to Kurigram to beg or to look for relief.

Some of those thanas e.g., Nageswari, Kurigram, Sunderganj, Shaghatta and Dewanganj, which are less severely affected in terms of the eight indicators nevertheless show aberrations on a few indicators. Thus Nageswari, although bountiful in terms of its man-land ratio, and relatively free from flooding because of its generally higher elevation, nevertheless had a high percentage of household out-migration. Discussion with local officials suggested that there had indeed been scarcity but not famine in Nageswari. The relatively high rate of household out-migration may have been due to the proximity of other opportunities because access to Kurigram and points west is easy via an army road and an excellent bus service from the north-east. Ulipur thana's high percentage of households migrating may also be due to attractions elsewhere because of the thana's proximity to Kurigram town from the south. Kurigram thana's high percentage of land loss may have been caused by its urban nature i.e., townspeople from Kurigram or people visiting the town saw an opportunity to buy up land during the scarcity. The high percentage (55 percent) of households eating bonn kochu in Sunderganj thana remains unexplained. The thana was relatively protected from the Tista and Brahmaputra flooding by the "right flood embankment" which had remained intact there. All local officials were in general agreement that the thana had not been severely affected by the famine and their judgement is supported by the generally low ranking on the other indicators for the thana. In Shaghatta thana the high

percentage increase in landlessness (12.5 percent), was probably partially the result of extensive river erosion on the right bank of the Brahmaputra during the 1974 monsoon. Local officials reported that "bank line migration" had been as great as 1 mile from east to west. Whether Shaghatta's high ranking on the "sales of household utensils" and the "eating of bonn kochu" is connected with the resulting household migration away from the river bank towards flood embankments further within the thana remains unsolved. Dewanganj thana's high ranking on "mortality caused by starvation and food lack" and the "percentage of children aged between 2 and 10 who were less than 80 percent of the standard weight for height" was probably caused by the inclusion of Hatibanga village, a large village of 26 households consisting 33 percent of the sample from the thana. According to local officials the severity of famine in Hatibanga village was unique in Dewanganj thana because of its riverine situation. Despite severe flooding and river erosion its remote situation had precluded the distribution of relief to that thana and the 26 households sampled had been severely affected by the terminal symptoms of famine.

C. Final Comparison of the Areal Intensity of Famine Symptoms with the Delbecq-Delphi Map:

The comparison of these composite indices of famine symptoms during the 1974-75 famine with the index of famine derived on the Delbecq-Delphi map shows no agreement.

Even a comparison of the dichotomous groupings (i.e., thanas "very liable to famine" and thanas ranked 1-5 on the

famine symptom index versus thanas liable to famine and thanas ranked 6-10 on the famine symptom index) does not show any agreement (Figure 6xi). As discussed earlier the Delbecq-Delphi process, which attempts to delimit liability at a regional scale, is unable to cope with the components of famine vulnerability which are described above at a local scale. In Section II it was also suggested that the components of famine vulnerability in a small local area such as this would be likely to change from year to year or even season to season, whereas the regional pattern of famine liability is likely to be more persistent.

Conclusion: The findings of this chapter support the proposition that the Delbecq-Delphi Map compiled in this study is able to differentiate areas liable to famine at a regional scale. This is supported by the map's general consistency with the mental maps that various groups have of such areas, by newspaper reports of areas affected by the 1974-75 famine, and by the map of the places of origin of bustee (slum) dwellers who have left their homes within the Dacca catchment area and hav then settled in urban slum conditions. A detailed inter-thana comparison of 10 famine-affected thanas, however, suggests that the Delbecq-Delphi map does not predict the intensity of famine symptoms at the thana level.

SECTION 7.

How does the map of areas liable to famine produced by the Delbecq-Delphi process relate to famine remedial policies?.

FAMINE REMEDIAL POLICIES

"Comment Faire Reculer la Pauvreté Rurale"

Gilbert Étienne

"The famine transformed some of the inertia of the past into energy."

B. G. Verghese

The Delbecq-Delphi map allows those making decisions on famine prevention and development at the national scale to focus on particular regions of Bangladesh that are more liable to famine than others. The map focuses attention on 124 thanas which are probably liable to famine and emphasizes an additional 40 thanas which are probably very liable to famine. The areas classed as being liable to famine include 26 percent of the land area of Bangladesh and 29 percent of the population. The small area which is very liable to famine covers only 9 percent of the area, but an additional 12 percent of the population. The opportunities to relocate the 21.4 million people from the area liable to famine and the additional 7.9 million from the area very liable to famine are limited (Revelle, 1970). The problem therefore has to be tackled principally within the areas themselves.

The simple act of focusing on these areas, brings attention to bear on the problem of anticipating famines there. The very act of highlighting these regions brings shape to the heretofore nebulous nationwide problem

of famine prevention, showing it as a manageable task for which specific preparations can be made.

The pattern of areas liable to famine is distinctive. Most such areas are riverine or coastal. In fact, the 40 thanas that are classed as being very liable to famine all abut on a major river or coast. Also, the proportion of thanas liable to famine is particularly high in north Bengal i.e., north of the Ganges river and west of the Brahmaputra river.

The map also indicates ten of the most crucial factors selected as being associated with famine liability in these areas. The cartographic documentation of these correlates of areas liable to famine encourages a change of thought from symptom to possible cause; from relief measures to possible preventive measures; and thus hopefully from increased external aid to increased indigenous self-help.

Knowing the areas liable to famine and the correlates of famine liability it should be possible to suggest remedial policies appropriate both to the particular area and to the particular cause. Any such remedial policies, however, as with any policy, must be sieved through the particular social and geographical situation where they are to be implemented. Some of the more important aspects of this situation in Bangladesh are the limited and constantly changing area of arable land, the seasonality and variability of the monsoon and its consequent hydrological patterns, the large and increasingly dependent and unemployed population, the

progressively impoverished rural landless population, and the overwhelming inability to evolve a coherent rural community initiative (see Section II)

The need to filter policies through such an indigenous context is often avoided or scrimped on by short term foreign consultants. The Delbecq-Delphi process (Figure 5iii) by allowing the involvement of local expertise and long term experience from the initial stages of the planning process, is assumed to partially provide a built-in contextual filter. Although in this case 25 percent of the initial 180 respondents were non-Bengali, the majority were nationals who had been raised in their own country. Certainly some had served a colonial government, some had travelled or been educated abroad, and most had read western literature, but they, nevertheless, represent the present Bengali decision makers. The bulk of the remedial policies they suggested for famine prevention in Bangladesh had thus been winnowed through their own experience of the country and through their cultural intuition.

All the 180 respondents were initially asked to suggest ways in which famine could be prevented from returning to the areas they had ringed as being liable to famine (see appendix A: Questions I and J; appendix B: Questions J and K; appendix C: Questions J and K; and appendix D: Questions J and K). They were asked what the villagers themselves could do and what the government could do. The responses fell broadly into two classes: national policies and local or regional policies. However, the local or regional policies were related to the

possible causes of the famine rather then to a particular famine location. This should have been expected in carrying out such a study at the national scale. However, knowing the areas affected by the possible causes (see the insets on accompanying Map), it is possible to allocate preventive measures proposed to remedy these possible causes to those same areas, (see the blue text on accompanying Map).

I. National Remedial Policies:

Suggested policies in response to the questions (see Appendices A, B, C, D) on potential preventive measures at the national scale ranged from the broad to the specific: from realization of the need for a "revolution of consciousness" to the more tangible "price stabilization" and "reorientation of agricultural education", to specific suggestions from "improved coordination" of famine prevention and "preparedness planning".

(A). Revolution of Consciousness: Despite the Muslim culture and the strong western ties, the suggestions seemed to mirror together the thoughts of both Paulo Freire (1970) and present day Chinese development strategies. To the need for a "revolution of consciousness" was added the need for the "rich to help the poor". The general call for "social reform" was backed by the calls for the "sharing of resources" and even a "commune system". Echoes of Chinese thoughts were further reflected in the urge to "use manpower not bull-dozers" and to "train students in rural areas". Along with this strong appeal to "gamble on new ideas" and to encourage both "self help" and "self ownership of agricultural land", the

overriding call was for "a definite rural policy". There was, however, either ambiguity or indifference as to whether this should be achieved by "a move towards socialism" or a "return to the old landlord system."

(B). Price Stabilization: A strong concensus of respondents suggested that the central government could beneficially manipulate prices before and during a famine. In the long term it was suggested that the government "maintain a base price for the main crops and publish this price at least one month before sowing." "Price subsidies" were also suggested to "encourage cereal production." This was supported by calls to "increase the rice price in normal times." When scarcity and famine broke out, however, "price control on essential foods" was suggested despite "the possibility of a mushrooming black market". It was suggested that Indo-Bangladesh black-marketeering be reduced during times of famine by appropriate "devaluation of the taka" and "strong military policing of the border and all road, rail and boat traffic". As a corollary to the rising food prices during times of famine the slump in prices for sales of possessions might be countered by an "improved government disaster credit system." The "availability of government loans rather than mohajan (moneylender) loans" might "stem the tendency towards polarisation of wealth". Price stabilization during famine might best be maintained by the "provision of unemployment specifically tailored to the skills of the poor".

(C). Reorientation of Agricultural Education: Respondents repeatedly stressed the need to "change the basic basic educational curriculum", to "lessen the emphasis on Political Science and English" and "establish agricultural sciences as a priority". They emphasized the need for a "greater appreciation of the value of manual labor". It was advised that the "agricultural university be reoriented" and that "agricultural education be regionalized", so that "agriculturalists from saline areas could be trained in saline areas" and "crop innovations could be matched with the particular hazard conditions" of different areas. Attempts should be made to "reduce dependence on the monsoon crops", and crop research should stress "famine avoidance crops" and "drought resistant plants" as well as "meshing cropping patterns with flood cycles and drought patterns".

(D). Improved Coordination of Famine Prevention and Preparedness Planning: The respondents stressed the need to "improve the coordination" of "overall disaster and famine prevention planning". Such coordination would be international, involving "landuse and water agreements with areas upstream in India, China and Nepal". Nationally there should be more "integrated planning between ministries" and there was a need articulated to "streamline the Ministry of Relief and Rehabilitation."

Famine preparedness planning should include "greater involvement in famine forecasting" including the "organization of a cell with 2-3 officers" with "technical expertise to

monitor famine warning indicators", e.g., "flood patterns", "rainfall trends", "sowing times", "satellite imagery analysis", "labour wages", "market prices", "transport availability", "local official reports" and "migration patterns". Respondents specifically mentioned the need to "identify famine prone areas" to "target relief to such areas early," to "identify and train famine remedial manpower among existing staff" (e.g., "Circle Officer Development", or the "Thana Agricultural Officer") in such areas and to "have small projects ready at subdivisional and thana level in order to provide employment".

II. Regional Remedial Policies:

Although the regional remedial policies suggested by the respondents in answer to the questions on remedial policies do develop from some of the national policies, I decided to arrange the responses around the 10 regionally related components of famine liability in particular areas of the country (see accompanying Map).

(A) Flooding: Destruction from flooding may be lessened by the "selection of crops whose growth patterns mesh with the flood patterns." This would entail "less dependence on the *kharif* and encouragement of *rabi* crops", e.g., "sweet potato", "potato", "sorghum", "groundnuts", "millet", "wheat" and "*boro* rice". Areas prone to early flash floods, e.g., Sylhet, Comilla, Chittagong, Rangpur and Dinajpur, might experiment with "early maturing and

stiff-strawed varieties of boro and aus". "Post flood recovery methods" should include "raised seed beds", "pre-germinated seeds", "the forced growth of seedlings on coconut mats", and "experiments with flood recovery crops" which are "appropriate to the area and to the particular time of year".

"Control of flooding is unlikely", but there are "possibilities of adjusting the timing and height of floods" by: 1. "putting the coinciding flood peaks of the tributaries out of phase to lessen the total flood height where the Brahmaputra and the Meghna meet"; 2. "afforestation on embankments and around tributary areas"; 3. "channelling flood sediments into bil areas"; 4. "local dyking and drainage schemes"; 5. "the demarcation of flood storage areas" to "use as fisheries" or as "areas for concentrating water hyacinth" "for mulch" and for "the production of biogas". "Experiments should be made with raised platforms for vegetables" e.g., "puishak, in rainflooded areas"; with "emergency floating gardens anchored near the baris"; and with "higher yielding varieties of deep water rice".

"Storage in flood areas should be in elevated godowns" that are "easily accessible during the floods". "The annual renewal of seed banks and cattle food stocks" should be accompanied by an "improved system of agricultural loans".

(B) Drought: In traditionally drought-prone areas, "drought-tolerant crops" such as "millets, sorghum, sweet potatoes and groundnuts" should be encouraged. Improved

"knowledge of both the seasonal extent and depth of local groundwater and potential water holding areas near rivers" might suggest irrigation improvements through such "small scale systems as bamboo tubewells". Further "investigation of such traditional irrigation systems" as "swing baskets and dons", should be considered particularly "for emergency use after natural disasters". "Irrigation should be encouraged to increase rabi crops", but attempts should also be made to "avoid excessive reliance on petroleum fuels. The possibility of "employing "hydraulic rams" or "windmills in areas with coastal or river breezes" should be explored. "A cooperative system for the repair and maintenance of existing pumps" becomes particularly important in times of drought.

If labor is available and there is a sufficiently high water table, experiments should be made to "resuscitate the derelict pukurs (tanks)". If the "technical and tenurial problems" of the tanks can be overcome they might be increasingly used not only "for irrigation", but "for fisheries" as well. "Planting shade trees" and the carefully controlled "introduction of fecal material" might be tried to "increase the productivity of the tanks".

(C) Population Pressure: Overpopulation at the village level becomes apparent because of the "failure to organize rural communities" and to "develop appropriate skills among their members". Village needs might be better articulated if "the landless and the artisans" were given "a voice in the

Union Parishad (Union council)". Aid might be channelled to "encourage landless villagers" to "attend functional education programs tailored to villager's perceived needs", e.g., "mulching" or "afforestation techniques". The "traditional social security system under the zamindars (landlords)", where "the rich tried to help the poor" in all but the worst years, should be "reinstated through the gram panchayat (village judiciary committee)". Aid might be allocated to panchayats only on the basis of their proven ability to: 1. "upgrade conditions for the landless"; 2. "organise the use of newly reclaimed land"; and 3. "organise wage labour migration prior to a crisis".

(D) Food Deficit: Some of the officially designated food deficit areas, e.g., Faridpur, become surplus areas in reality after "migratory wage labourers return from surplus areas", e.g., Sylhet. Although "improved rodent-proof dharma golas (community storage)", especially if located "near the areas vulnerable to natural disaster", might be effective if community organization were improved, at present "improved individual Bari golas (household storage)" seem likely to be more effective. Agricultural "extension workers might revive traditional storage methods", e.g., "oiling clay jalas and kolshi", "hermetically sealing them with clay" and "inserting gypsum", if available or "charcoal", to "reduce humidity". If they are available, the use of "pucca drums" might also "reduce rodent, pest, moth, weevil and mildew attack". "Improved fumigation" with carbon bisulphide and "drying

techniques" should also be explored for both household storage and local supply depots.

The growth of such "alternative crops" as "dates, bananas or potatoes" on non-cereal land might be encouraged by improvements not only in storage but also in "food preservation techniques", e.g., "drying" or "carbide gassing".

(E) Lack of Alternative Employment: Disaster relief aid might provide a "unique opportunity to revitalize rural industry" if basic craft skills are extant, but "long term foreign market links must also be established". A preliminary "survey of existing skills", e.g., in "bele mati (clay)" "kansha (brass)", "paat shilpa (jute handicrafts)", "musleen (muslin)", "bansh (bamboo)", "kanch (ceramics)" and "jaal bona (net making)", should suggest areas in need of "functional education for the revival of traditional craftsmanship".

After a natural disaster the "timely distribution of agricultural inputs for recovery", e.g., "seeds", "fertilizer", "ploughs", "kodals (digging hoes)", and "hand irrigation systems", could minimize the need for additional employment. "Should immediate recovery be impeded" because of ponding, salinity or sterile sand deposition, then "previously arranged food for work programmes for the unskilled and landless", e.g., "dyking", "afforestation", "tank clearing", and "multipurpose canal excavation", should be quickly "put into operation, before the physical condition of the family wage earners deteriorates". In many cases the "need for employment may be anticipated in the 'slack' famine season between the monsoon flooding and the aman harvest".

"If community organization can be strengthened, a communal system of alternative employment might be explored". "Immediately after a natural disaster, certain wage-earning community members might be sent in search of temporary employment" in "fishing" or in "urban areas".

(F) Low Crop Yields: Many of these one crop areas actually have a surplus in normal years. "Cooperative" and "enlarged individual storage systems", like those in Sylhet, could retain such surplus in the area for times of disaster. Investment in "horticulture", "poultry", "livestock", and "bamboo groves" can be viewed as an additional form of storage for lean periods. The present "excessive reliance on one crop" necessitates close attention to "possible blight or saline incursion in such areas". Where possible, "early maturing varieties of rice" should also be introduced to "minimize the risk from early flash floods".

(G). Poor Land Transport: In times of disaster, "remote areas must be kept in better communication with Dacca", either by allowing increased "use of existing army radio links by public officials", or by providing an "independent disaster radio system". If these radio links were in contact with a "disaster information unit in Dacca", an "improved version of the Bengal Famine Code" system of "monitoring scarcity conditions and disasters" could be established. Village elders might also "listen daily to a specific frequency at a particular time for disaster warnings".

Although "improved road communications are required" in such areas as "the Barind tract", "water transport should be increasingly considered for the distribution of relief" in other areas, particularly "the coastal areas west of Barisal". "Most of the thanas which are very liable to famine are riverine". Estimates of the likely "seasonality of disaster" in different areas might help to "determine the need for all-weather roads to replace dirt tracks". "Country boat and bullock cart owners might be paid and prepared to serve as post disaster transport."

The vulnerability of remote areas might be reduced by "decentralising storage facilities from Chittagong", by "improving the condition of godowns in remote areas", by "strong law enforcement in border areas" and by "improved control of border commerce to prevent smuggling." "Rice cordoning within the country should be used only with caution". "Strengthening village community organization", although "difficult to institute", could "lessen the loss of grain from remote villages in times of impending famine".

(H). River Erosion: With the possible exception of urban areas, "no efforts should be made to control erosion at this time" "unless it occurs in minor tributaries" where it can be combatted with "afforestation". Possible adjustments, however, might include the "introduction of quick maturing varieties of crops in erosion-prone areas". These would then allow "early harvesting before forced migration must occur". If there are "alternative skills" in the area,

e.g., "fishing", "boat building" or "net making", they should be encouraged. Rapid "recovery on the depositional bank" might benefit from "increased research on legal aspects of riverine land transfer" and "rigorous enforcement of riverine land laws". "Increased research in sand land agricultural techniques", "greater knowledge of germination times in different soil and moisture conditions" for "sorghum", "millet" and "sweet potatoes", should eventually allow a rapid recovery of employment levels on the depositional banks and chars.

(I). Cyclones: Although cyclones occur relatively suddenly and have "disastrous immediate effects", the "surviving population is initially healthy and well-nourished". They are thus "able to recover if the means of recovery are available". The "development of water communication for relief distribution" is particularly important in areas that are susceptible to cyclones. Although "people have been reluctant to use the killa system of raised mounds for shelter", "the killas should nonetheless be retained for sheltering water, food, seeds, cattle and farm equipment". A "water level embankment system might also be developed for sheltering fishing and relief boats". "The low level storm surge and salinity embankments should be carefully maintained and forested if possible". It is important that "sluices be carefully maintained", and where possible, "systems of controlled breaching" should be tried. "Afforestation should be encouraged on all non-cereal land". Besides those

trees that provide shelter, e.g., "coconuts" and "betelnuts", other "trees might also provide an income source", e.g., "bamboo" and "bananas." "Settlement of cyclone-prone areas should be minimized" until the "vulnerability of the one-crop areas prone to saline incursion and cyclone" is reduced by the "planting of an additional crop in the rabi season" and until the "development of fishing", "fish farming" and related "employment for the slack period" in the agricultural calendar. Any "settlement developments that do occur should be on elevated grounds" and "enclosed by trees" and should "avoid the use of corrugated sheeting," which can become a lethal weapon in high winds.

(J). Maldistribution of Agricultural Inputs: Inputs for agricultural production have to "reach the appropriate people at the appropriate place and at the appropriate time". Although this is "basically an administrative and organizational problem", "distribution directly to the cultivators" can be facilitated by the "use of boats during the wet season in the flooded areas". "Increased perennial use should be made of water transport". "Supply centers should be decentralized and moved to north Bengal." "Village cooperatives should permit the membership of landless labourers."

"Priority for aid to these cooperatives" should be determined by their ability to provide quality inputs by critical dates to small cultivators." "Storage facilities for agricultural inputs" should be increased and improved. Experimentation with such "mulches" as "pukur sludge",

"weeds" and "water hyacinth", should be tried in an effort to "lessen the vulnerable dependence on petroleum based fertilizer inputs".

These suggested famine remedial policies,[1] both national and regional, are neither mutually exclusive nor immutable. Many still need greater refining and further adjustment to local areas. They merely offer a broad gamut of alternatives: possible options if famine can be anticipated in certain areas of Bangladesh. They offer substitutes for the unilinear doles of food relief which have been the traditional response to starvation. However, they have to be implemented while the "degrees of freedom" in terms of individuals physical strength, and the communities' social integrity still remain.

The national policies suggested by the respondents emphasized the need for a "revolution of consciousness" and the regional policies suggested by them persistently allude to the need for "community organization" and "cooperation". These both indirectly highlight the difficulty in persuading an impoverished Bengali agriculturalist to individually risk taking time off from his own work for the good for the community, e.g., to build a small scale irrigation system, unless he is certain that all the other necessary members of the community will also take the risk and join him

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[1]The likelihood that these remedial measures will be included in famine prevention plans is high because the decision makers suggested them. They chose the components of famine liability, they weighted those components, and thus they suggested the areas liable to famine where such remedial measures should be implemented.

on the community project which would bring them all the benefits of development. Perhaps relief aid, if properly channelled to ancitipated projects through an established village administrative structure like the newly suggested "gram sarkar" (village government) (Chaudhuri, 1978) can provide the needed stimulus to lessen that risk.

If the remedial policies suggested in this report are to be successfully implemented amidst the famine crisis and if "relief is to be put into a development context" by the carrying out of these policies, it is essential that there must be a mechanism for breaking out of the present community-level development dilemma.

SECTION 8.

What can be done to improve such Delbecq-Delphi studies.

The most obvious desideratum would be time. The Delbecq-Delphi Process Section 5 derives much of its effectiveness from its simplicity, but this cannot be equated with speed. Time is required to elect a broad and representative initial target population who can bring a spectrum of perspectives to an often previously ill-defined problem. Time is required to sieve out the representative and available group with the greatest experience to join the Delbecq and Delphi sessions. Much more time than was allocated in this study is required in the editing stage (Figure 5iii) where an additional discussion session between the experts from the different fields would probably produce a more coherent list of factors and more meaningful criteria. Such a meeting might also suggest data sources that actually were available, rather than those that were thought to be available. Time is also required to arrange to bring the groups together at a time convenient to all members. If there had been time it might have been possible to display a map showing the actual areal extent of each of the 10 components before the Delphi panelists weighted each of them. It might also be preferable to have an additional meeting once the final Delbecq-Delphi map was prepared to include the responses of panel members after viewing the "gestalt" of the finished map which was compiled from the components which they had initially selected and weighted.

Although such a multifaceted problem transcends disciplines and often government ministries, the time requirements could be reduced by institutionalizing the Delbecq-Delphi process either within a supra-ministerial organization, like the planning commission, or, if the problem were more specific, within a ministry like the Ministry of Relief and Rehabilitation. Such institutionalization of the technique should be done by a senior government officer such as the secretary of a ministry moderating a group of lower ranked officials such as the section officers who were already under his jurisdiction. A geographical component could be brought to this planning by the secretary of the ministry requesting the deputy commissioners for each district to come to Dacca for a Delbecq-Delphi session on a particular problem. This would ensure a comprehensive areal coverage of different regions.

SECTION 9.

What are the limitations of this Delbecq-Delphi study of areas liable to famine in Bangladesh?

Despite the limited data available in this case, the proposition was upheld: it was possible "to delimit areas liable to famine in Bangladesh." There are certain regions of Bangladesh, namely the riverine and coastal areas and north Bengal, that are more susceptible to famine than others. It was not, however, possible from the national level to refine the mapping to beyond the individual thana level. This appears to result from three major limitations.

1. Delphi panelists were probably unclear about the implications of some of the concepts they were considering and weighting.
2. The Delphi panelists were probably unable to grasp the nationwide significance of some concepts, e.g., flooding.
3. It is unlikely that the significance of any concept, however carefully defined, is constant throughout a nation even a small one like Bangladesh. Thus lack of rain for a given period may have a very different effect in Noakhali from that in Rangpur.

In addition to these limitations on the certainty of delimiting the areas liable to famine, two other limitations of the study should be re-emphasized:

1. Not all the people, nor all the villagers in the thanas liable to famine are necessarily going to be affected by famine. Those with savings and storage, or with strong links outside the area are likely to remain resilient to famine.
2. The probabilities described in this study are low. They do not suggest that areas which are not classed as "very liable" or "liable" to famine will not suffer from famine in the future. They may, but present conditions in those thanas make them less likely to suffer from famine.

How long this geographic pattern of famine liability is likely to persist depends upon both physical and economic factors. I foresee the broad riverine and coastal pattern persisting unless there are major river changes due to tectonic activity. The famine liability of north Bengal is likely to increase if population migration to the area continues at a rate greater than the improvement of dependable irrigation. Rapid population in-migration to Sylhet and the Chittagong Hill Tracts might increase their famine susceptibility. Also in Sylhet population pressure might become too great for the traditional storage mechanisms to cope with. The Hill Tracts, although presently sparsely populated, are also susceptible to development. The agriculturalists there have lost their land on the valley floor because of the Kaptai Dam and thus agriculture is now encroaching on the steep forested hill sides which are prone to landslides and which traditionally were the storehouse for alternate foods in times of famine. The pattern of famine liability may improve over small areas. Famine liability might be reduced if projects were implemented in certain thanas, either some of the remedial projects suggested earlier or other integrated projects which couple the provision of perennial employment and the lessening of risk to natural hazards.

SECTION 10.

In what directions should this research proceed in Bangladesh and elsewhere?

At present I see two principal directions in which further research might proceed: one would continue the theme of defining areas liable to famine both in Bangladesh and elsewhere, and the other would proceed

to a further stage by examining the early warning signals of famine in some of the areas now delimited as being liable to famine.

Within Bangladesh the accuracy of the areas designated as being liable to famine could and should be improved down to the union level so that specific projects can be prepared in readiness for implementation. It might be possible to use improved historical areal information on past famines, e.g., the data on the symptoms of the 1896-97 famine in Bengal, which were documented at the union level, but which have previously been unavailable to researchers. Alternatively, it has been suggested (Berry, 1976) that a nationwide survey of village elders, asking them to recall past famines and scarcities, might permit further areal differentiation. The problem of regional and local dialectical differences, both in linguistic terms and in the perception of scarcity and famine, however, might lessen the value of such a study. Rather it would seem more appropriate to implement the Delbecq-Delphi process in each of the 62 subdivisions using local officials, village elders and, if possible, landless laborers, as the initial groups of respondents.

The application of the Delbecq-Delphi process is limited neither to Bangladesh nor to famine problems. It could, with improvement, be developed as a general planning tool in developing countries where areal data is limited. I myself would propose its use initially for further famine liability studies in India, Indonesia, Cambodia, Vietnam, Afghanistan, Ethiopia, Haiti and Kenya. Not only would they form useful

policy studies, but they would also help to elicit the different components of famine liability in these different countries. The application of the technique to the Sahelian countries, e.g., Mauritania, Senegal, Mali, Upper Volta, Niger and Chad, should be encouraged, but modifications will have to be made to accommodate the areal shifts in liability as a result of the large proportions of the population who are nomadic.

This report has intentionally avoided becoming involved in short term famine prediction. Earlier it was stated that too little was understood about the inter-relationships among the components of famine vulnerability to predict when famine was going to occur. However in seeking to understand the structural components that make certain areas liable to famine, the dissertation has uncovered some initial findings that would encourage further research on short term famine warning systems, particularly in the areas found to be liable to famine in Bangladesh.

Earlier I suggested the importance of seasonal cycles in weather, crops, hydrology, employment and nutrition.

I showed how a disruption in the meshing of the flood and crop cycles may have been the "trigger mechanism" for the 1974-75 famine. Figure liv in Section 1 showed the demographic trends for Purundapur village during the famine and suggested how the timing of the onset famine symptoms compared with those triggering mechanisms. Earlier I also suggested a series of other famine symptoms that could be

monitored through time, e.g., land sales, sale of possessions, migration, nutritional levels and the eating of famine food stuffs. By integrating the longitudinal monitoring of these trends, seasonal cycles and disruptions, it might be possible to suggest a short term predictive model for famine. Once again, however, the early detection of famine symptoms will require the drawing of information from many scales: from international reports of the grain trade and rainfall patterns, from national reports of transport and storage availability, and from village level perceptions of change in the local social and economic conditions. Undoubtedly these will vary from one part of the country to another.

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APPENDIX A

Perception of Famine in Bhedarganj Thana by Murubis

Survey Code:

Sample No.:

Name (Respondent): _____

Village Name: _____ J.L. No.:

Bari Name: _____ Malaria No.:

Religion (Respondent):

1. ☐ Islam
2. ☐ Hindu
3. ☐ Other

Age (Respondent): ☐ ☐ ☐

Perceived Income Level of Household:

1. ☐ Well off
2. ☐ Middle
3. ☐ Poor

Date of Interview: _____

Name (Interviewer): _____

Time Interview Begins: _____

Time Interview Ends: _____ Duration of Interview ____ min

Estimate of Response: ☐ Very Willing

☐ Normal

☐ Reticent or Unwilling

Scrutinized by: _____

Coded by: _____

Verified by: _____

Punched by: _____

Verified by: _____

A. Do you remember within your lifetime?

1. /_/ Partition
2. /_/ 50 Mananther
3. /_/ 26 Cyclone
4. /_/ None of the above
5. /_/ Don't know

B. Were you born in this village?

1. /_/ No
2. /_/ Yes
3. /_/ Don't know

<u>If No</u>, have you lived in a neighbouring village?

1. /_/ Since before partition
2. /_/ Since before the 50 Mananther
3. /_/ Since before the 26 Cyclone
4. /_/ None of the above
5. /_/ Don't know

C. What is an 'ovab'?

_____

_____

_____

_____

D. What is the difference between an 'awarab' and a 'kahar'?

_____

_____

_____

_____

E. At what point does an 'awarab' become a 'kahar'?

_____

_____

_____

_____

F. How many 'awarab' do you recall in this village?

1. ☐ One
2. ☐ Two
3. ☐ Three
4. ☐ Four
5. ☐ Five
6. ☐ More than five
7. ☐ None
8. ☐ Don't know

G. In your lifetime when was the worst 'awarab' or 'kahar' in this village?

Bangla Year ☐ ☐ ☐ ☐ English Year ☐ ☐ ☐ ☐

H. Why do 'awarabs' visit your village?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

I. What can the people of the village do to prevent the 'awarab' coming to your village again?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

J. What can the government do to prevent 'awarab' coming again to your village?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

K. Do you know anywhere outside Faridpur which is prone to 'awarab'?

1. /_/ No
2. /_/ Yes
3. /_/ Don't know

Thank you for all the answers to our questions about awarab. Now we just have two final questions about your education and occupation.

L. What education did you receive?

1. /_/ Cannot read or write
2. /_/ Quran only
3. /_/ Primary
4. /_/ High School or Madrasa
5. /_/ Matriculation
6. /_/ H.S.C.
7. /_/ B.A.

M. What is your primary occupation?

1. /_/ Retired
2. /_/ Owner/Cultivator
3. /_/ Tenant/Sharecropper
4. /_/ Businessman
5. /_/ Imam/Head of Madrasa
6. /_/ Teacher
7. /_/ Service
8. /_/ Other

APPENDIX A

OPINIONS ON FAMINE BY RETIRED GOVERNMENT OFFICERS

Name:_____ Time Begun:_____

Date:_____

In connection with a project for the Ministry of Relief and Rehabilitation of the Bangladesh Government to "Map the Areas Liable to Famine In Bangladesh", your name has been suggested as a retired Government officer with considerable experience in different districts of Bangladesh, especially in connection with scarcities and famines. Would you be willing to initiate this project by answering a set of questions about your experience of famines and scarcities in Bangladesh.

I'd like to start straightway to look at the differences between scarcities and famine by asking for your definition of both:

A. What is a scarcity?

_____

_____

_____

_____

_____

_____

_____

B. What is a famine?

_____

_____

_____

_____

_____

_____

_____

C. At what point can an area in Bangladesh be declared to be a "famine area" as opposed to a "scarcity area"?

D. Do you think that it is possible to predict when local famines will occur in Bangladesh

☐ NO

☐ YES

☐ DON'T KNOW

If YES, how?

Any qualifications or exceptions mentioned:

253

E. Do you think there are certain factors which make some areas of Bangladesh persistently more liable to localized famine where government gruel kitchens have to operate.

☐ NO

☐ YES

☐ DON'T KNOW

If YES, which factors?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

9) _____

NOTE Register Map.

On this map of Bangladesh, could you carefully outline with thin felt tip marker the rural areas persistently liable to famine where government gruel kitchens have to operate.

NOTE

Any areas about which you are uncertain ring with a dotted line.

F. Are there any towns in Bangladesh that you think are persistently liable to famine where government gruel kitchens have to operate?

(NOTE: Do not mark the towns on the map.)

/__/ NO

/__/ YES

/__/ DON'T KNOW

If YES, which towns?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

You outlines _____ areas on the map. Could you rank them by putting a (1) in the area most persistently liable to famine and then a (2) in the area next most liable to famine and so on down to Number _____.

NOTE: If any 2 areas are considered to rank equally, mark them clearly (1A) and (1B) and then rank the next one (3).

G. Now for each of the areas you've outlined, can you suggest reasons why those areas are persistently liable to famine. (If you want to group certain areas together, just tell me which numbers to put together.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

H. Do you think that there are any measures that the villagers themselves can take to prevent famine visiting their villages?

/__/ NO /__/ YES /__/ DON'T KNOW

If YES, for each of the areas you outlined, list possible measures:
(If you wish to group certain areas together, just tell me which numbers are to be grouped.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

257

I. Do you think that there are any measures that the government can take to prevent famines in those areas?

/__/ NO /__/ YES /__/ DON'T KNOW

If YES, list the measures for each area. (Again, if you wish to group certain areas together, just tell me which numbers are to be grouped.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

5) _____

5) _____

6) _____

J. In discussing those areas liable to famine, you have drawn on your experience as a former government officer. Could you now run through details of your career with me, noting any degrees you took after high school, the different government posts you held, and for how long, and whether you were ever involved in relief areas in any of the districts.

(a) Education _____

_____

(b) Entered Service: _____

(c) Government Service Record:

Year Beginning	District	Period of Service	Post	Involvement in Relief

K. Which year did you retire from Government Service? _____

L. During your career did you ever read through the Bengal Famine Code?

/__/ NO

/__/ YES

/__/DON'T KNOW

/__/ OTHER, SPECIFY: _____

M. Which of Bangladesh's 19 Districts have you never visited?
(Include "passing through" as "a visit".)

1. /__/ Bakerganj
2. /__/ Bogra
3. /__/ Chittagong
4. /__/ Chittagong M. T.
5. /__/ Comilla
6. /__/ Dacca
7. /__/ Dinajpur
8. /__/ Faridpur
9. /__/ Jessore
10. /__/ Khulna
11. /__/ Kushtia
12. /__/ Mymensingh
13. /__/ Noakhali
14. /__/ Pabna
15. /__/ Patuakhali
16. /__/ Rajshahi
17. /__/ Rangpur
18. /__/ Sylhet
19. /__/ Tangail

N. Could you give the names and addresses of five other retired government officers, who have served in relief operations in rural areas of Bangladesh and who are now living in Dacca.

	NAME	ADDRESS	TELEPHONE
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

O. Finally, would you yourself be interested and available, if necessary, to participate at a seminar and dinner to explore this problem further on _____ at 7:00 p.m.

/__/ NO

/__/ YES

/__/ DON'T KNOW

THANK YOU FOR ALL YOUR HELP!

TIME: _____
DURATION: _____
DATE: _____

APPENDIX B

OPINIONS ON FAMINE BY AID DONORS

Name:_____ Agency:_____

Nationality:_____ Time Begun:_____

Date:_____

In connection with a project for the Ministry of Relief and Rehabilitation of the Bangladesh Government to "Map the Areas Liable to Famine in Bangladesh", your name has been suggested as an Aid Donor with expertise in _____. Would you be willing to initiate this project by answering a set of questions about your experience of famines and scarcities in Bangladesh?

I'd like to start straightway to look at the differences between scarcities and famines by asking for your definition of both:

A. What is a scarcity?

_____

_____

_____

_____

_____

_____

_____

B. What is a famine?

_____

_____

_____

_____

_____

_____

_____

C. At what point can an area in Bangladesh be declared to be a "famine area" as opposed to a "scarcity area"?

D. Do you think that it is possible to predict when local famines will occur in Bangladesh

☐ NO

☐ YES

☐ DON'T KNOW

If YES, how?

Any qualifications or exceptions mentioned:

E. Do you think there are certain factors which make some areas of Bangladesh persistently more liable to localized famine where government gruel kitchens have to operate.

☐ NO

☐ YES

☐ DON'T KNOW

If YES, which factors?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

9) _____

NOTE Register Map.

On this map of Bangladesh, could you carefully outline with thin felt tip marker the rural areas persistently liable to famine where government gruel kitchens have to operate.

NOTE

Any areas about which you are uncertain ring with a dotted line.

F. Are there any towns in Bangladesh that you think are persistently liable to famine where government gruel kitchens have to operate?

(NOTE: Do not mark the towns on the map.)

/__/ NO

/__/ YES

/__/ DON'T KNOW

If YES, which towns?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

You outlines _____ areas on the map. Could you rank them by putting a (1) in the area most persistently liable to famine and then a (2) in the area next most liable to famine and so on down to Number _____.

NOTE: If any 2 areas are considered to rank equally, mark them clearly (1A) and (1B) and then rank the next one (3).

G. Now for each of the areas you've outlined, can you suggest reasons why those areas are persistently liable to famine. (If you want to group certain areas together, just tell me which numbers to put together.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

H. Do you think that there are any measures that the villagers themselves can take to prevent famine visiting their villages?

/__/ NO /__/ YES /__/ DON'T KNOW

If YES, for each of the areas you outlined, list possible measures:
(If you wish to group certain areas together, just tell me which numbers are to be grouped.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

I. Do you think that there are any measures that the government can take to prevent famines in those areas?

/__/ NO /__/ YES /__/ DON'T KNOW

If YES, list the measures for each area. (Again, if you wish to group certain areas together, just tell me which numbers are to be grouped.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

5) _____

5) _____

6) _____

J. Of those _____ areas outlined:

	1	2	2	4	5	6	7	8
In which of the areas are you still supporting or have you supported programmes?	☐	☐	☐	☐	☐	☐	☐	☐
In which of the areas have you had, or do you still have, your programmes running?	☐	☐	☐	☐	☐	☐	☐	☐
In which of the areas have you yourself worked for over a week at any one time?	☐	☐	☐	☐	☐	☐	☐	☐
Which of the areas have you visited? (Include "passing through" as a "visit")	☐	☐	☐	☐	☐	☐	☐	☐
In which of the areas do you know that government gruel kitchens have operated?	☐	☐	☐	☐	☐	☐	☐	☐

K. Which of Bangladesh's 19 Districts have you never visted, (Include "passing through" as a " visit")

1. /__/ Bakerganj
2. /__/ Bogra
3. /__/ Chittagong
4. /__/ Chittagong M. T.
5. /__/ Comilla
6. /__/ Dacca
7. /__/ Dinajpur
8. /__/ Faridpur
9. /__/ Jessore
10. /__/ Khulna
11. /__/ Kushtia
12. /__/ Mymensingh
13. /__/ Noakhali
14. /__/ Pabra
15. /__/ Patuakhali
16. /__/ Rajshahi
17. /__/ Rangpur
18. /__/ Sylhet
19. /__/ Tangail

L. Have you yourself worked in rural Bangladesh outside of a district town for over 3 months?

/__/ NO

/__/ YES

/__/ DON'T KNOW

M. How long have you been working Bangladesh? (In total, if you've been here several times.)

/__/ Less than 1 year

/__/ 1 - 2 years

/__/ 2 - 5 years

/__/ 5 - 20 years

/__/ Greater than 20 years

N. Have you ever read the Bengal Famine Code?

/__/ NO

/__/ YES

/__/ DON'T KNOW

O. Can you give me a rough description of what your job here entails:

_____

_____

_____

_____

_____

P. What was your training and background before you began this job:

_____

_____

_____

_____

_____

Q. Do you think you'd be willing and available to participate at a seminar and dinner to explore this problem further on _____ _____.

/__/ NO

/__/ YES

/__/ DON'T KNOW

THANK YOU FOR ALL YOUR HELP!

Time: _____
Duration of Interview: _____
Date: _____

271

APPENDIX C

OPINIONS ON FAMINE BY TECHNICAL EXPERTS

Name:_____ Agency:_____

Nationality:_____ Time Begun:_____

Date:_____

In connection with a project for the Ministry of Relief and Rehabilitation of the Bangladesh Government to "Map the Areas Liable to Famine in Bangladesh", your name has been suggested as a technical expert with expertise in _____ _____. Would you be willing to initiate this project by answering a set of questions about your experience of famines and scarcities in Bangladesh.

I'd like to start straightway to look at the differences between scarcities and famines by asking for your definition of both:

A. What is a scarcity?

_____

_____

_____

_____

_____

_____

_____

B. What is a famine?

_____

_____

_____

_____

_____

_____

_____

C. At what point can an area in Bangladesh be declared to be a "famine area" as opposed to a "scarcity area"?

D. Do you think that it is possible to predict when local famines will occur in Bangladesh

☐ NO

☐ YES

☐ DON'T KNOW

If YES, how?

Any qualifications or exceptions mentioned:

E. Do you think there are certain factors which make some areas of Bangladesh persistently more liable to localized famine where government gruel kitchens have to operate.

☐ NO

☐ YES

☐ DON'T KNOW

If YES, which factors?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

9) _____

NOTE Register Map.

On this map of Bangladesh, could you carefully outline with thin felt tip marker the rural areas persistently liable to famine where government gruel kitchens have to operate.

NOTE

Any areas about which you are uncertain ring with a dotted line.

F. Are there any towns in Bangladesh that you think are persistently liable to famine where government gruel kitchens have to operate?

(NOTE: Do not mark the towns on the map.)

/__/ NO

/__/ YES

/__/ DON'T KNOW

If YES, which towns?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

You outlines _____ areas on the map. Could you rank them by putting a (1) in the area most persistently liable to famine and then a (2) in the area next most liable to famine and so on down to Number _____.

NOTE: If any 2 areas are considered to rank equally, mark them clearly (1A) and (1B) and then rank the next one (3).

G. Now for each of the areas you've outlined, can you suggest reasons why those areas are persistently liable to famine. (If you want to group certain areas together, just tell me which numbers to put together.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

276

H. Do you think that there are any measures that the villagers themselves can take to prevent famine visiting their villages?

/__/ NO /__/ YES /__/ DON'T KNOW

If YES, for each of the areas you outlined, list possible measures:
(If you wish to group certain areas together, just tell me which numbers are to be grouped.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

I. Do you think that there are any measures that the government can take to prevent famines in those areas?

/__/ NO /__/ YES /__/ DON'T KNOW

If YES, list the measures for each area. (Again, if you wish to group certain areas together, just tell me which numbers are to be grouped.)

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

Area No(s) ___

1) _____

2) _____

3) _____

5) _____

5) _____

6) _____

J. Of those _____ areas outlined:

	1	2	3	4	5	6	7	8
In which of the areas are you still connected or have you been connected with aid or research programmes?	☐	☐	☐	☐	☐	☐	☐	☐
In which of the areas have you yourself worked for over a week at any one time?	☐	☐	☐	☐	☐	☐	☐	☐
Which of the areas have you visited? (Include "passing through" as a "visit")	☐	☐	☐	☐	☐	☐	☐	☐
In which of the areas do you know that government gruel kitchens have operated?	☐	☐	☐	☐	☐	☐	☐	☐

K. Which of Bangladesh's 19 Districts have you never visted, (Include "passing through" as a " visit")

1. /__/ Bakerganj
2. /__/ Bogra
3. /__/ Chittagong
4. /__/ Chittagong M. T.
5. /__/ Comilla
6. /__/ Dacca
7. /__/ Dinajpur
8. /__/ Faridpur
9. /__/ Jessore
10. /__/ Khulna
11. /__/ Kushtia
12. /__/ Mymensingh
13. /__/ Noakhali
14. /__/ Pabna
15. /__/ Patuakhali
16. /__/ Rajshahi
17. /__/ Rangpur
18. /__/ Sylhet
19. /__/ Tangail

L. Have you yourself worked in rural Bangladesh outside of a district town for over 3 months?

/__/ NO

/__/ YES

/__/ DON'T KNOW

M. How long have you been working Bangladesh? (In total, if you've been here several times.)

/__/ Less than 1 year

/__/ 1 - 2 years

/__/ 2 - 5 years

/__/ 5 - 20 years

/__/ Greater than 20 years

N. Have you ever read the Bengal Famine Code?

/__/ NO

/__/ YES

/__/ DON'T KNOW

280

O. Can you give me a rough description of what your job here entails:

_____

_____

_____

_____

_____

P. What was your training and background before you began this job:

_____

_____

_____

_____

_____

Q. Do you think you'd be willing and available to participate at a seminar and dinner to explore this problem further on _____ _____.

/__/ NO

/__/ YES

/__/ DON'T KNOW

THANK YOU FOR ALL YOUR HELP!

Time: _____
Duration of Interview: _____
Date: _____

SOCIO-ECONOMIC AND NUTRITIONAL STATUS AT THE HOUSEHOLD LEVEL IN SAMPLE VILLAGE

APPENDIX D.

Name of Respondent: _____

Thana Village: _____

Relation of Respondent to Household Head: _____

Village Name: _____

Religion of Household Head: 1 = Muslim
2 = Hindu
3 = Christian
4 = Other

1. Present household members:
   - Include the respondent if a member of the household
   - Exclude servants and visitors
   - Insert name of household head in the row against serial number 1

Serial No.	Popular Name	Marital Status 1 = Single 2 = Married 3 = Widowed 4 = Divorced 5 = Separated	Relationship to Household Head	Occupation		Sex 1 = Male 2 = Female	Age (Years)	Children's Nutritional Measurement (Above 2 and less than 10 years)	
				Primary	Secondary			Height (mms) Barefoot Less than 130 cms	Weight (0.1 kgs) Only sari/lungi 1 = Over 25 kgs
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

2. Since the beginning of last Ramzan, have any children been born alive in your household?

1 = No
2 = Yes
3 = Don't know

If Yes, how many?

Total
Male
Female

3. Since the beginning of last Ramzan, have any members of your household left the house never to return?

1 = No
2 = Yes
3 = Don't know

If Yes, fill in the following table:

Sl #	Popular Name	Sex 1 = Male 2 = Female	Marital Status on Departure 1 = Single 2 = Married 3 = Widowed 4 = Divorced 5 = Separated	Age (Years) (Now)	Relationship to Household Head	Date of Move 1 = 1st Ramzan-Eid Ul Azha 2 = Eid Ul Azha-Bengali New Year 3 = Bengali New Year-Present	Occupation Before	Sequel 1 = Contact 2 = No Contact 3 = Died 4 = Don't Know
1.								
2.								
3.								
4.								
5.								

4. Since the beginning of last Ramzan, have any members of your family died at home?

1 = No
2 = Yes
3 = Don't know

If Yes, fill in the following table on Page 3.

Sl #	Popular Name	Sex 1 = Male 2 = Female	Marital Status 1 = Single 2 = Married 3 = Divorced 4 = Separated	Age (Years) (Now)	Relationship to Household Head	Date of Death 1 = 1st Ramzan-Eid Ul Azha 2 = Eid Ul Azha-Bengali New Year 3 = Bengali New Year-Present	Cause of Death	Occupation Before Death

5. How many members lived here in your household at the beginning of last Ramzan?

Total /__/

Male /__/

Female /__/

6. Details of household landholdings:

- In each case, first ask an exploratory question e.g. Do you own any land at present?
- If the answer to the exploratory question is 'No' or 'Don't know,' Code '1' or '3' respectively in the 'Answer' column.
- If, however, the answer is 'Yes,' inquire about the amount of land, and enter the verbatim reply in e.g. Bighas in the 'Answer' column before converting it to 'Acres.'

Present Land Owned		Amount Owned 1st Ramzan		Since 1st Ramzan							
				Land Lost to Erosion		Land Lost to Sand Dumping		Land Mortgaged		Land Sold	
Answer	Acres	Answer	Acres	Answer	Acres	Answer	Acres	Answer	Acres	Answer	Acres

284

9. Has your household ever received food relief since the beginning of last Ramzan?

1 = No
2 = Yes
3 = Don't know

10. Has any member of your household attended a gruel kitchen for food since the beginning of last Ramzan?

1 = No
2 = Yes
3 = Don't know

11. How many times per day have your household usually been having a rice meal since Bengali New Year?

1 = Three or more times
2 = Two times
3 = One time
4 = Never
5 = Other - Specify: _____
6 = Don't know

12. What was the usual food for your household members:

A. Between beginning of last Ramzan and Bengali New Year? _____

B. Between Bengali New Year and the Present? _____

7. Details of household possessions:

Possessions	# Possessed at Present	# Sold Since 1st of Last Ramzan	Reason for Sale 1 = To buy food 2 = Other - Specify	# Possessed at 1st Ramzan
Buffalo				
Cow				
Bull				
Goat				
Plough				
C.I. Roof				
Cart				
Boat				

Other possessions sold to buy food:
1. /__/ Kitchen utensils
2. /__/ Furniture
3. /__/ Ornaments (gold/silver)
4. /__/ Wood
5. /__/ Others - Specify: _____

8. Has any member of your household ever been on test relief since the beginning of last Ramzan?

1 = No
2 = Yes
3 = Don't know

/__/

If Yes, when?

1 = Between the beginning of last Ramzan and Bengali New Year
2 = Between Bengali New Year and the Present
3 = Both
4 = Don't know

/__/

286