Simultaneous Estimations of Population Growth

THE PAKISTAN EXPERIMENT

By

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INTRODUCTION[1]

The PGE (abbreviation for Population Growth Estimation) experiment has arisen out of the widely held feeling am ng economists and development planners that in many underdeveloped countries population growth is the most critical of all relevant variables. Demographers, census takers and registrars of vital events are unable to provide accurate and up-to-date information in this crucial field because of the difficulties inherent in collecting the information. This deficiency has been apparent in Pakistan for a long time. The current (Second) Five Year Plan, in fact, states: "It is important that there should be continuing surveys of the current size and characteristics of the population and the levels of birth and death rates"[2].

Judging by the experience of Western-type countries, a system of vital-events registration takes decades, if not centuries, before it reaches an acceptable degree of completeness. Periodic surveys provide, or at least aim at providing, a swifter answer but depending basically—as they do—on human recollection and on a consistent understanding of a time reference, they frequently produce obviously inadequate answers. The feeling has long been shared among demographers that a combination of both methods

*Lt-Col. Nazir Ahmed is Project Director and Chairman of the Managing Committee of the PGE experiment. Dr. Karol J. Krotki is Member of the Managing Committee, Representative of the Joint Director of the Institute of Development Economics in Karachi on the Managing Committee, and Convener of the Steering Subcommittee. Outside their PGE responsibilities the authors are respectively Director-General of the Central Statistical Office (CSO) and Research Adviser to the Institute of Development Economics (IDE).

1. The authors are grateful, for comments received on an earlier draft, to Mr. Lowell T. Galt, Principal Statistical Adviser, U.S. A.I.D., Karachi; Dr. John T. Kantner, Professor of Demography, Social Sciences Research Centre; Dr. Mark W. Leiserson, Joint Director, Institute of Development Economics, Karachi.

2. Government of Pakistan, Planning Commission, *The Second [illegible] 1965*, (Karachi: Manager of Publications), p. 335.

(the continuing registration and the periodic survey) would compensate for the weaknesses of each method[3]. From information on vital events caught by both methods, those caught by one but missed by the other and those caught by the other but missed by the first, an attempt could hopefully be made to estimate those missed by both. There is a method for estimating the category mm (missed in both), if information is available on cc, cm

		Registration	
		caught	missed
Surveys	caught	cc	cm
	missed	mc	mm

and mc. It requires very strong assumptions, which could prove unrealistic[4], but at least an attempt could be made to estimate the category mm. Very briefly and very crudely if the category cc is large relatively to categories cm and mc, then category mm is likely to be small and other things being equal, the method is likely to produce reasonably reliable results.

The yearning for some such approach is already of long standing and has been expressed often in formal or less formal ways. This feeling is widespread among demographers of many countries. "Il serait intéressant sur la même zone mais suffisamment étendue d'avoir un état civil complete et une enquête par sondage mettant en oeuvre vos[5] abaques pour se rendre compte de la précision de la méthode. Mais le temps, l'argent et le personnel sont des difficultés bien difficiles à surmontre"[6]. These thoughts have been expressed most systematically and provided with a tentative solution in a paper presented to the International Population Conference

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[3]. For an early recognition of the potentialities, *see*: Philip M. Hauser, Ph.D., *The Use of Sampling for Vital Registration and Vital Statistics*, reprint from *Bulletin of the World Health Organization*, 1954, 11, 5-24, p. 20. The rest of the article, however, limits itself almost entirely to a discussion of *either* one approach *or* the other. It does not elaborate in any way the idea thrown out on p. 20 and which is the basis of the PGE experiment, though it provides a wealth of stimulating suggestions of increasing elegance and sophistication for an experiment based on *either* one *or* the other alternative.

[4]. C. Chandrasekar (now: Chandrasekaran) and W. Edwards Deming, "On a Method for Estimating Birth and Death Rates and the Extent of Registration", *Journal of the American Statistical Association*, Vol. 44 (1949), pp. 101-115.

[5]. The writer refers to various methods described in Karol J. Krotki, "The Use of Quasi-Stable Population Theory with Census-Collected Vital Events ", *International Population Conference*, (New York: 1961), paper No. 63.

[6]. A letter dated 16-2-62 to Karol J. Krotki from G. Théodore, Le Chief de la Division Central des Enquêtes et Etudes Statistiques, Ministère de l'Agriculture, République Francaise.

in New York in 1961. One of us was fortunate enough to be present when the paper was being conceived at Princeton University[7]. It is this paper which is the basis of the PGE experiment and a brief summary in the next section of this article provides the theoretical introduction to the experiment.

Lest the impression be created that the PGE experiment will provide definitive information on vital rates prevailing in Pakistan, or for that matter in any other country which would carry out a similar experiment, let it be clear at outset that this is not so. The theoretical limitations of the Chandrasekar-and-Deming solution being severe and the actual outcome of the experiment depending on vagaries of the varying degrees of human attention, not only among respondents but also and perhaps mainly among the collectors of the information, the results cannot be final. However, the PGE results may be supported by other information, notably by the age and sex data of the recently conducted second national census. This support may be reinforced by comparing the recent with the previous and first census. If a degree of consistency between the various results is found, it can be taken as a confirmation of all or some of the results coming, as they do, from different sources and being largely independent of each other. The stable population theory and its quasi-stable elaboration[8] provide an effective tool of analysis with a population like that of Pakistan. Any degree of uncertainty produced by PGE results can be removed, or at least reduced, with results coming from such entirely independent source as those used by the quasi-stable population approach.

CONCEPT BEHIND THE EXPERIMENT

This section is a brief summary of the paper parental to our experiment and already referred to earlier[9]. The author disclaims originality for his paper by quoting the other paper[10] also already referred to in this article and mentioning the fact that use of individual matching of data from registration and from census was undertaken in the United States in 1940 and 1950. He then proceeds to explain the design of the proposed experiment. "The underlying technique is to obtain data on individual events in the sample

7. Ansley J. Coale, "The Design of An Experimental Procedure for Obtaining Accurate Vital Statistics", *International Population Conference*, (New York: 1961), paper No. 13.

8. United Nations, Bureau of Social Affairs, Population Branch, "Stable and Semi Stable Population Models and Their Use in Estimating Vital Rates and Characteristics of Population Structure". Draft in French dated April 1962. The authors are obliged to the Director of the Population Branch for permission to quote the first draft of this important publication, which has been received in the first instance for purposes of critical commentary.

9. Coale, *op. cit.*

10. Chandrasekar and Deming, *op. cit.*

area by two independent means." The mode of recording information and its extent must be similar in both parts of the experiment (the registration and the survey) and sufficiently extensive to provide enough items to establish unmistakable match individual by individual. The difficulty of establishing matches with certainty is stressed.

On the other hand, the opposite problem of the need to preserve the independence of the two parts of the system is explained in detail and its difficulties described. "It will take a good administrative machinery and very close supervision to see that collaboration (between the field workers of the two parts of the experiment—our insertion) does not occur."

Once these two problems (of matching and independence) are solved, there can be no doubt about the advantage of *individual* matching. Global comparisons of the results of each system may give an idea of the relative efficiency of each system, but individual matching makes it possible to estimate the completeness of both systems. The only danger "is the existence of a correlation between the probability of omission from each of the two system."

This deficiency can be, under favourable circumstances, substantially cured by the division of events into subclasses which leads to a more adequate estimate. The divisions required are such as to provide subclasses with different degrees of omissions, *e.g.*, the births of children dying young and dying older or not at all.

Various elaborations are possible on this general theme. One or two are suggested by the author. A variety of others are described in this article either as under trial or as considered and discarded or as worthwhile, but not yet attempted. The important characteristic of our experiment, the novelty of which is also stressed by Coale, is that a representative sample of the whole country is being taken, *i.e.*, the results, if in accordance with the plans, will be of more than local validity and applicability.

ORGANIZATION

Relations between CSO, IDE and Population Council

The PGE project is a joint venture of the Central Statistical Office of the Government of Pakistan and the Population Council of New York. The overall responsibility for the project vests in a Managing Committee and executive responsibility for day-to-day administration of the project is carried out by the Director-General of the CSO who acts as the Project Director and ex-officio Chairman of the Managing Committee. According

to the present agreement, costs connected with the Cross-sectional Surveys are met by CSO while those pertaining to Longitudinal Registration are met by the IDE with funds provided by the Population Council.

The Research Adviser for Demography on the staff of IDE represents the Joint Director of the IDE on all technical discussions relating to the project and assists the Project Director in the formulation of policy and in the determination of important procedural details connected with the project. The interest of the Population Council is in the *total* experiment and not only in that part of it which is financed by the Council. The role of the Population Council is by no means limited to the mere provision of funds. The Project Director, the Research Adviser and the Managing Committee can call at any time on the Population Council, and have done so frequently, on any topic, whether technical or organizational, for advice which is freely given through its technical and professional officers.

Managing Committee and Steering Subcommittee

The Managing Committee[11] governs itself by its own statutes. It meets periodically to review the progress of the project, to formulate new policies and to plan such measures in pursuance thereof as may be necessary from time to time for the smooth and orderly administration of the project. The Steering Subcommittee of the Managing Committee meets more frequently, sometimes as often as once a week. The procedures governing the activities of the Managing Committee, the Steering Subcommittee and the work of the Staff Officer and his staff have been assembled in a special manual[12].

National Sample Survey and Cross-sectional Surveys

The cross-sectional part of the project is being carried out by the National Sample Survey Division of the CSO whose regular staff visit the sample areas every quarter, having begun on January 1, 1962.

During the Cross-sectional Surveys, details of family composition and changes therein are recorded by enumerators who have been selected from among the more experienced members of the NSS field force and have been

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[11]. At the time of drafting this article (June 1962) the Managing Committee apart from the two authors was composed of four other members: Mr. Lowell T. Galt, Principal Statistical Adviser, A.I.D., Mrs. Dorothy S. Cooke, Statistical Survey Adviser, A.I.D.; Mr. M.A. Wahab, Chief Survey Officer, CSO; Mr. M.H. Sheikh, Chief Statistical Officer, CSO. Mr. T.M. Durrani, a full-time employee of the PGE in the post of Staff Officer of the LR part of the experiment, acts as Secretary of the Managing Committee.

[12]. Government of Pakistan, Ministry of Finance, Economic Affairs Division, Central Statistical Office, *Population Growth Estimation: Headquarters.* Special Studies Series PGE 4. (Karachi: January 1962).

given special training for this purpose. A separate manual of instructions governing their activities has been developed and several editions, as experience has accumulated, have been issued[13].

Longitudinal Registration

Under the Longitudinal-Registration part of the experiment, PGE registers are maintained of all births and deaths in respect of the population of the sample areas. Whole-time registrars have been recruited and appointed for this purpose and they work in close cooperation with the local Union Councils/Committees.

In East Pakistan, the LR work is being coordinated by Statistical Survey and Research Unit of the University of Dacca. In West Pakistan, the field operations are controlled directly by the office of the Project Director. A manual on Longitudinal Registration has been evolved, similar to the one on Cross-sectional Surveys[14].

Relations with Central and Local Authorities

The project proposal was initially cleared through the Ministry of Home Affairs, which conducts population censuses in Pakistan and also through the Ministry of Health and Social Welfare, which is responsible for policy control in respect of birth and death registration. The provincial governments have also been kept informed and through them district authorities have been approached with a request to extend their support to the project. The Project Director personally toured some of the areas and addressed local meetings. Members of the Managing Committee have also toured some areas and have thus helped to enlist local support for the experiment.

The success of the experiment, in the last resort, depends upon the day-to-day cooperation of the Union Council/Committee chairmen. Besides official instructions, personal letters have been written to all of them by the Project Director and there is evidence of considerable interest and enthusiasm amongst them for this work. This cooperation is especially significant because under a government directive these local authorities now have legal responsibility for birth and death registration. The experience gained

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[13]. The latest one is Government of Pakistan, Ministry of Finance, Economic Affairs Division Central Statistical Office, *Population Growth Estimation ; Cross-Sectional Surveys.* Special Studies Series PGE 3. (Karachi: April 1962).

[14]. Government of Pakistan, Ministry of Finance, Economic Affairs Division, Central Statistical Office, *Population Growth Estimation: Longitudinal Registration.* Special Studies Series PGE 2. (Karachi: December 1961).

in this project should go a long way to bring out realistically some of the important problems involved in this work; and thus pave the way for a better nation-wide network of vital registration. However, such lessons would be merely by-products of the experiment. Its main task is to find out as accurately as possible vital rates. A different model would probably be designed if its purpose was the launching of a registration system, effective in one's lifetime rather than in centuries.

Relation to Existing Registration Systems

Existing registration systems in Pakistan (in the plural, because there are more than one) are notoriously defective. The systems depend in a large measure on casual reports by petty officials (and in urban areas on the voluntary information of the households concerned). The results of such registration cannot be depended upon for accurate measurement of current levels of fertility and mortality. Nor can they be used for population forecasts. No attempt has, therefore, been made to correlate in the initial stages the PGE experiment with the existing registration system, except that PGE registrars are required to use, among other informational leads, locally prevailing registration records of birth and death occurrences. As the PGE experiment proceeds and becomes established as a going concern, it may be found feasible to coordinate it with the customary registration systems.

THE SAMPLE

The Universe

The universe for the purpose of drawing this sample is the total *de facto* population of Pakistan with the exclusions shown on the map of Pakistan on pages 56 and 57. Area-wise these exclusions appear formidable but population-wise they are much less significant.

In East Pakistan, the whole district of Chittagong Hill Tracts has been excluded. It would not have been difficult to conduct the experiment there. Public order and security are of high order and the people are friendly and cooperative. However, their ethnical, racial and religious origin and current characteristics are different from the rest of the population of East Pakistan to a considerable degree. The excluded population is less than one per cent of the total population of East Pakistan[15].

[15]. This, like all other figures given, refers to the 1951 census results, unless a specific statement to the contrary has been made. At the time the sample was selected no detailed enough figures from the 1961 census were published. The advantage of obtaining them by special arrangement with the Census Commissioner was too insignificant to justify the amount of work involved. With the way the sample was drawn, it was also probably unnecessary.

In West Pakistan, thirteen per cent of the total population of West Pakistan had to be excluded. These were the inhabitants of tribal areas and of former Baluchistan. The latter are so sparsely populated that any method of intensive registration worked out for other areas could hardly be suitable for them. The inhabitants of tribal areas are difficult to deal with. Over substantial areas, no public security guarantee can be given. In others, very special approaches would be required, particularly in fields as intimate as family events and relationships. It is most interesting and heartening to see that some highly specialized enquirers are venturing into at least some of these tribal areas, though for the time being only into the less troublesome parts. They are bringing back original material of great value[16].

Sampling Fraction and Method of Drawing the Sample

In East Pakistan, the rural areas of the four administrative divisions were treated as separate strata. Contiguous thanas (the fifth administrative unit, below provinces, divisions, districts and subdivisions) in each stratum were combined to form groups of size equal to an approximate population of 14,00,000. There were twenty eight such groups in the four strata corresponding to the twenty eight substrata used by the National Sample Survey Division of the CSO. Two groups of thanas from each stratum or eight groups in all, were selected at random. One Union Council was selected at random from each selected thana. From the area under the jurisdiction of the selected Union Council[17], a part with approximately 5,000 persons was chosen at random as the sample area.

To select the urban sample areas the administrative divisions of Dacca and Chittagong were combined in one stratum. Rajshahi and Khulna divisions were combined to form another stratum. One town was selected from each stratum with probability of selection proportionate to population size. From each selected town one Union Council was selected at random. From the area under the jurisdiction of the selected Union Council, a part with approximately 5,000 persons was chosen at random as the sample area.

In West Pakistan, two of the twelve administrative divisions (Kalat and Quetta) were wholly outside the sample universe by virtue of the exclusions described above. Those rural parts of the other ten administrative divisions, which were not so excluded, were made up into eight strata by

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[16]. *E.g.*, Khalid Ashraf, "The Tribal People of West Pakistan", (Peshawar University: Board of Economic Enquiry, 1962). A manuscript received at the IDE for critical commentary.

[17]. Very approximately, the populations in the territories of Union Councils can be considered as being of equal size and of about 10,000 persons each.

combining the Peshawar Division with the Dera Ismail Khan Division and the Karachi Division with the Hyderabad Division. It is relevant to point out that substantial proportions of the first two divisions (Peshawar and Dera Ismail Khan) were excluded since they lie in the tribal belt, while the rural part of the Karachi Division is quite small and did not change appreciably the population size of the Hyderabad-cum-Karachi stratum. Contiguous tehsils[18] (the fourth administrative unit after provinces, divisions and districts) in each stratum were combined to form groups of size equal to an approximate population of 8,00,000. There were twenty eight such groups in the eight strata corresponding to the twenty eight substrata used by the NSS. One group of tehsils was selected at random from each stratum. One tehsil was selected at random from each selected group of tehsils. The remaining part of the selection procedure was identical with that below thanas in East Pakistan as already described.

The selection procedure for the urban sample areas in West Pakistan was identical with that employed in East Pakistan except that Peshawar, Dera Ismail Khan, Rawalpindi, Lahore, Multan and Sargodha divisions were combined into one stratum while Bahawalpur, Khairpur, Hyderabad and Karachi divisions were combined into the other stratum.

It will be noted that while there are two sample areas in each of the rural strata in East Pakistan, there is only one sample area in a stratum in the rural areas of West Pakistan. It is recognized that the one-sample-area-per-stratum arrangement will make it impossible to calculate the within-stratum variability unless over the cries of sampling purists the eight rural strata in West Pakistan are combined into four strata and four urban areas of both East and West Pakistan are combined into two strata. It is believed that the course chosen, while unhelpful from the point of view of pursuing the game of elegant (and probably esoteric) variance presentations, will be beneficial for the estimation process.

With the selection procedure described above, the following sampling fractions were intended:

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[18]. Called *talukas* in divisions of Hyderabad and Khairpur (the old Sind Province).

	Universe population[19]	*Intended sample*	*Sampling fraction*
East Pakistan: rural	4,78,37,000	40,000	.00084
urban	26,18,000	10,000	.00382
West Pakistan: rural	2,88,88,000	40,000	.00138
urban	93,94,000	10,000	.00106
Pakistan: in the PGE	8,87,37,000	100,000	.00113
Pakistan: excluded	50,63,000		
Pakistan: total	9,38,00,000		

It will be noted that the sampling fraction for rural West Pakistan is higher than for rural East Pakistan. This was made necessary by the greater heterogeneity of the inhabitants of West Pakistan and their greater-assumed-variability in levels of mortality and fertility. The high sampling fraction for urban East Pakistan, in comparison with urban West Pakistan, is no doubt wasteful; but for obvious reasons, it was not possible to take a smaller sample in absolute terms in the towns of East Pakistan. We believe that the relative size of our resources devoted to the urban areas, both in East and West Pakistan, is out of proportion to the demographic significance of these areas[20]. However, we are aware that this is not a view generally accepted, particularly by those who see in urbanization a catalytic element in the population transition[21] from high fertility and high mortality to low fertility and low mortality. We felt more sanguine about the suggestion that Karachi should be a separate stratum. We feel — though this is, no doubt, still conjectural — that Karachi is no different demographically from other urban areas of West Pakistan. We think that enquirers are impressed by its

[19]. According to the results of the 1961 census as given in *Census Bulletin No. 2, Population Census of Pakistan, 1961: Final Tables of Population, Sex, Urban-Rural, Religion,* (Karachi: Office of the Census Commissioner, Ministry of Home Affairs, 1961).

[20]. This is not intended to say that the two urban wards in each province are adequate samples of the urban population of each province. As sample of the urban population they are not, but the sample is that of the *whole* population.

[21]. The probably fullest exposition of the transition theory of population is available in, Frank W. Notestein, "Economic Problems of Population Change", *Proceedings of the Eighth International Conference of Agricultural Economists,* (London: Oxford University Press, 1953).

importance because it is too often on their doorsteps. In any case, Karachi had already more than its fair share of attention[22].

Expected Sampling Error and Reliability of Sample Estimates

It will not be possible to form even a first view about the probable sampling errors until the first results become available for some minimum length of time. However, the conjectural suggestion may be made that unless the variability of fertility levels and mortality levels between the various PGE areas is much more volatile (or erratic) than anticipated, the annual PGE results will be subject in each part (LR and CS) of the experiment separately to a sampling error of some two per cent for the crude birth rate (CBR) and of some three per cent for the crude death rate (CDR). These figures are suggested for the provinces at the 0.05 probability level. For smaller areas larger errors must be expected. In plain language, it means that if we obtain from the sample of a province an annual CBR of 50, there will be no more than one chance out of twenty that the true CBR is more than 51 or less than 49, while a sample-obtained annual CDR equal to 30 will suggest that the risk that the true CDR is greater than 32 or smaller than 28 is also only one out of twenty. The resultant natural increase from such rates of fertility and mortality subject to such sampling variability would vary between 2.3 per cent to 2.7 per cent — quite a wide variation and not much narrower from what we can approximate using the stable population theory and its quasi-stable varient[23], but better than what has been available so far. There may also be some "savings" by a more appropriate use of statistical theory, of which the writers are not yet aware. Doubling the sample, which would mean doubling the cost of the experiment, would narrow the band of uncertainty around the natural increase less than the roundings necessary at our order of approximations.

The reliability of the results for any other characteristic (*e.g.*, by occupations) or at a lower level (*e.g.*, starta or seasonal) would be correspondingly greater, if it could be kept within reasonable limits at all.

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[22]. *E.g.*, Nazir Ahmed, *Survey of Shelterless Persons in Karachi 1959*, (Karachi: Manager of Publications, 1959).

Central Statistical Office, *Report on Sample Survey of Karachi Population 1959*, (Karachi: Manager of Publications, 1959).

Forthcoming monographs on 'The People of Karachi' by members of the Demographic Section of the IDE.

[23]. *E.g.*, Karol J. Krotki, "A First Glance at Pakistan's Age Distribution," *The Pakistan Development Review*, Vol. I, No. 1, Summer 1961, pp. 64-75.

Or

A.S. Mohiuddin Ahmed, "The Population of Pakistan: Past and Present," An unpublished doctoral dissertation accepted by the Duke University, U.S.A., and summarized in *The Pakistan Observer*, Dacca, Friday, November 2, 1962.

These figures have been calculated literally and figuratively on the back of an envelope and will remain highly conjectural until first empirical material comes to hand. How meaningful the belts of uncertainty suggested above are is not clear, because we find statistical theory unhelpful in this connection. The standard error of the natural increase (CBR minus CDR) obtained from each part of the experiment separately can be calculated for each part through the usual formula of the error of a sum or difference. We are not aware of a way to calculate the joint variance of the LR and CS results, so differently arrived at and yet not entirely independent[24]. Apart from the problem of noninterdependence, there is the basic assumption that from each part of the experiment a biased sample of the universe of events will be obtained. It may, therefore, be more appropriate to look at the sample as one sample *after* the *matching* has been completed, not as two (in)depedent samples.

However, having accepted acknowledgement to statistical theory, one must state at once that whatever the calculated sampling errors, the non-sampling errors are likely to be, for the PGE results, much more important. And if the total error is thought as the Pythagorian sum of the squares built on the two legs[25] on both sides of the right-angle of the triangle, then it is no use worrying about the leg of the standard error, if the square of the hypotenus is determined predominantly by the leg of the bias. We believe that, within reason, no matter what actual sampling variability our field results may show, the essence of the success or failure of the PGE experiment will be decided somewhere between the categories mc, cm and more likely the mm category described in the introduction to this article.

Comments on Intended Stratification and Actual Sample

Some comments about stratification have already been made during the description of the selection procedure. More generally, it can be asserted with some confidence that the stratification was probably as good as it could have been in the then prevailing state of our knowledge. We think that we have achieved the double purpose of reducing within-stratum variances and ensuring a representative sample. The administrative divisions used by us for the purpose of stratification correspond probably as closely as any other ones we could design to the relevant demographic, ethnic, racial, sociological and economic differentials. While reaching for cultural homogeneity we used geographical areas because they were available, but we feel that they served our purpose. The contention of these remarks is not

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24. The authors would be glad to stand corrected and would gratefully acknowledge suggestions in their subsequent report or reports.

25. William Edwards Deming, *Some Theory of Sampling*, (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, 1950). p. 129.

that no better stratification is feasible for Pakistan, but that in the then prevailing circumstances of available information and time-stable requirements, the stratification eventually adopted was the best at that time possible.

It is likely that actual experience will provide a measure of confirmation or refutation of the confidence with which we look at the stratification. We are already aware of one or two disappointments and they may just as well be reported here, though in principle this article is meant to be an outline of the blueprint, and not a report on findings. The five examples given are useful illustrations of the kind of problems experienced in practice by a sample which at least in theory was drawn correctly on the basis of the information available.

1) PGE area 255 Khudadad was chosen as the sample point from the stratum made up by the (exclusively, as we thought at that time, Sindhi-speaking) rural parts of Hyderabad division. In fact, most of Khudadad PGE area is inhabited by Punjabi-speaking colonists who came to cultivate newly irrigated areas and presumably still observe their Punjabi mode of living.

2) In PGE area 244 Raman, part of the sample covered some twenty or so dwellings under the jurisdiction of the Amir of Bahawalpur, who enjoys certain rights in the nature of ex-territoriality guaranteed in the document of his accession to Pakistan. No doubt if His Highness had been approached in his progressive outlook he would have granted the necessary permission, but this at that time could not be undertaken due to pressure of other calls, and the dwellings concerned were excluded from the sample area.

3) It is not certain whether the inclusion of the prostitutes ward in PGE area 222 Bhedian provided the sample with an unrepresentative population. There is a suggestion that the prostitutes' fertility and mortality conditions are not fundamentally different from those of the more orthodox population and it may well be that the representativeness of the sample intended to measure births and deaths did not suffer by their inclusion[26].

4) On looking through our material collected to-date, the persistent suggestion arises that the rural sample areas show a considerably higher proportion of actual suburbia than a truly random sample would bring forth. On the other hand, the selection of the urban sampling units on the basis of 1951 figures may have taken insufficient account of radical expansion of cities over the decade. The suburbia of the rural sample areas may com-

[26]. However, we insert this point more under pressure from our colleagues than because we are convinced ourselves of its validity.

pensate for the possibility that the urban sample areas have too little. Only a detailed enquiry into the probabilities could have a chance of determining these doubts with greater certainty. It is improbable that such an enquiry could even be started because of the difficulties of definition of urban, suburban and rural components in the whole-country figures. Should there be anything in this admittedly unpleasant possibility, it is not suggested that the sample was drawn dishonestly by the National Sample Survey Division of the CSO, but the possibility of an explanation similar to the one suggested for the last and fifth case described below, cannot be excluded.

5) Finally, the sample areas seem to show a tendency to concentrate within six or seven miles of the nearest railway line. A quick calculation suggested that the probabilities are against such an outcome on the assumption that the sample was drawn randomly, but again too much turns on definitions and delineations of the areas concerned to be certain without a much more detailed enquiry. It may well be that the population itself tends to concentrate more along railway lines; that is more than the population statistics suggest and that there is nothing wrong with the sample. Should the sample be biased, it need not have been due to the senior NSS officials deciding that they can walk up to six or seven miles but no more. It may be a fact that the grip of the administration runs stronger along railway lines and that, therefore, the frame from which the sample was drawn is more complete near the railways than further away from them.

THE OPERATIONS

CS Procedure

During the first quarterly Cross-sectional Survey, which was scheduled to start on January 1, 1962, one enumerator was allotted to each PGE area and instructed to enumerate its population. Even when allowances have been made for the fact that some of the enumerators were slow in starting, the early misgivings of some members of the Managing Committee that one enumerator in one PGE area will not always complete the enumeration before the next quarter, were soon justified.

With effect from the next quarter beginning on August 1st, 1962, the procedure was changed. Three or four or five enumerators under one Field Coordinator are now allotted to each PGE area. If one Field Coordinator has more than one PGE area in his territory he is to enumerate them one by one. The enumerators move as a team. Exceptionally, one enumerator can be left behind to deal with particularly hard cases of no-contact.

The Field Coordinator has copies of maps of the PGE area. These maps were reproduced at the headquarters from the registrar's maps. They show, among other things, the dwelling numbers alloted by registrars to inhabited dwellings. On the strength of this information the Field Co-ordinator carves up the area among his enumerators in such a way that they finish their alloted tasks at about the same time. He takes into account the number of dwellings, the distances to be walked, the enumerator's ability and local problems, particularly in the field of public relations of which he may be aware.

It is an important task of enumerators to investigate *all* habitable dwellings in their area, not only those with dwelling numbers. Their areas are delineated in terms of geographical features and not dwelling numbers. During their first visit they enumerate the whole household in duplicate through carbon on form "Household Composition". One copy is sent to headquarters ; the other is retained in the office of the Field Coordinator. During the subsequent visits to the same household the Field Coordinator's copy is consulted by the enumerator (preferably, but not necessarily, the same one who made the earlier visit or visits) and only changes in the household composition are recorded on the Field Coordinator's copy. At the end of the day, these changes are extracted onto form "Changes in Household Composition" which is despatched to headquarters.

We are aware of the danger that that kind of arrangement could delineate into mechanical enquiries about people previously enumerated to the exclusion of new arrivals and earlier omissions. Any alternative to new enumerations, complete from scratch at each visit, could not be contemplated because of the inconvenience caused to respondents and the public relations aspect of asking the same question every three months. We dealt with the problem through considerable stress on instructions, the relevant manual and during training periods.

During each visit questions are asked about vital events which took place in the household, while the household was in the PGE area over the last twelve months, *i.e.*, "since the same time last season". These are recorded on form "Enumerated Vital Events". With four quarterly visits, each vital event should, therefore, be recorded four times except for the first three visits when earlier events will be dropping out after having been enumerated only once, twice or three times. The questions are phrased on a *de facto* basis. An infant born to a young wife who lives in the PGE area normally, but went to have her child in her own mother's house, will be recorded on the household composition form as an immigrant, but *not* as a vital event on form "Enumerated Vital Events". If he died before he returned with his mother to the PGE area, he will not be recorded at all. The only trace will

be the termination of the pregnancy on the household composition form. With a large sample like ours for every *de jure* mother who has her child *de facto* outside the PGE area boundaries, there should be a *de facto* mother from outside the PGE areas who will have come to the PGE areas for the purpose of child-bearing. However, if our sample has an urban and suburban bias, then the *de facto* basis for registering births will not be offsetting with respect to events occurring in and out of the area, but this is probably no more than a formal point.

LR Procedure

The general organization of the Longitudinal Registration part of the PGE experiment has already been sketched in subsection "Longitudinal Registration". It is only necessary to explain the registrar's preparatory tasks and his daily chores.

Late in 1960 after a period of ten days training in two centres, registrars went out to their allotted areas and mapped them. For each PGE area one map of the area and its surroundings was produced: so-called map No. 1. It shows boundaries of the PGE area, the component villages, access from the nearest larger centres and the position of the PGE area among neighbouring areas. For each village shown on map No. 1, one map No. 2 was produced: the Village Map. It is to show blocks in the village. For each block shown on map No. 2, one map No. 3 was produced: the Block Map. It is this last map which shows the dwelling numbers of all inhabited dwellings as well as all other structures, whether habitable or not. The numbering of dwellings on metal plates with black paint provided by headquarters was almost as arduous a task as the mapping.

These two preliminary tasks were completed on the average early in December 1960. The maps were reproduced in the headquarters in nine copies required by the various echelons of the PGE organization. The registration of vital events was started immediately so that by the time the appointed date (January 1, 1962) came, the registrars had already had some experience of their main task.

The registrar spends one hour a day in his quarters. This hour is announced on a large attractive board displayed over his quarters. The hour varies between seasons and areas to suit prevailing climatic conditions. No single vital event has yet been reported (up to June 1962) during such an "office hour" but it is felt that in principle the registrar should be available to the public at an appointed hour. In practice, the registrar does his desk work during this time. For the remaining seven hours of the day, he is supposed to be out visiting the PGE area.

A PGE area is divided into *sectors*, each sector consisting of around nine dwellings. A sector should have a homogeneous population, preferably tied with some community bond and at least one reliable contact. The contact may be changed with time or even with each call, but the essence of a sector is that at least one enquiry is made in a sector during one routine round. A *routine round* consists of five or ten or fifteen or twenty *daily rations*. A daily ration consists of as many sectors as can be conveniently contacted by one registrar in one day. Thus, each sector is contacted once a week or once a fortnight or once every three or four weeks, depending on whether there are five or ten or fifteen or twenty daily rations. The sixth day of the week (or Friday, the Moslem sabbath) is reserved for special enquiries. On Friday, the registrar follows special leads and contacts the myriad of irregular sources like the coffee-house, the barber, the mosque and the midwife. In urgent cases, he is permitted to pursue special enquiries on other days as well, but then the given daily ration drops either fully or partly out of the given routine round. In other words, there is no substitution.

Although it is easily ascertainable throughout the organization in which sectors on any given day a registrar is supposed to work, in addition he must leave in a box attached to his board a dated note every time he leaves his quarters giving his itinerary and expected time of return. It will be appreciated that with this procedure inspection trips can be economical and effective.

It is an important part of the registrar's task to keep his maps and the numbering of dwellings up-to-date. This, too, is one of the Friday tasks. All changes are reported on the registrar's monthly report and passed on by headquarters to all nine holders of PGE maps.

Field Products and Matching

Copies of registration documents arrive monthly and thus provide another frequent check on the work in the field. There are also weekly reports from registrars, in which they give in a standardized fashion and on simple forms an hourly account of their activities. In addition, there are reports from Senior Registrars (Field Inspectors in East Pakistan) and senior inspecting officials. In the latter case, a massive document of ten pages with more than a hundred questions has been evolved. It is hoped to ensure in this way a comprehensiveness and uniformity of approach, which will also provide a sufficient amount of background material for the analysis of the actual registration documents.

Copies of survey documents arrive quarterly. They are also buttressed by a variety of other reports from enumerators and from the several layers

of inspecting officials. The survey documents are much more bulky than the registration documents and only a small proportion of them is required for the actual matching process, namely the "Enumerated Vital Events" form. The household composition forms have performed their main function when they forced the enumerator to enquire in detail into the household composition.

Upto the time of drafting this article (June 1962), no matching has been done. The matching manual[27] is not yet complete, although extensive advice and reports on experiences elsewhere have already been received and studied.

Substantive Non-Matching Data

After the first Cross-sectional Survey a large number of household composition forms became available. With, say, 100 households in each PGE area there will be 20,000 forms. Every subsequent quarter perhaps as many as 5,000 or 10,000 corrective forms will be arriving. The information collected covers such diverse information as household composition, occupation, age-and-sex structure, marital status, several migration items, pregnancy. A separate manual[28] is intended for the analysis of this information, but real work in this field must await further finance and additional personnel.

Contents of Matching and Non-Matching Information

The information collected by enumerators and registrars can best be shown in summary table giving for all forms an indication against each item information whether it is collected on the given form. It is important to appreciate while looking at the table that both the order and phrasing of the items is purposely varied between the forms of the two parts of the PGE experiment.

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[27]. Government of Pakistan, Ministry of Finance, Economic Affairs Division, Central Statistical Office, *Population Growth Estimation: Matching*. Special Studies Series PGE 5. (Karachi: expected date of first publication—December 1962).

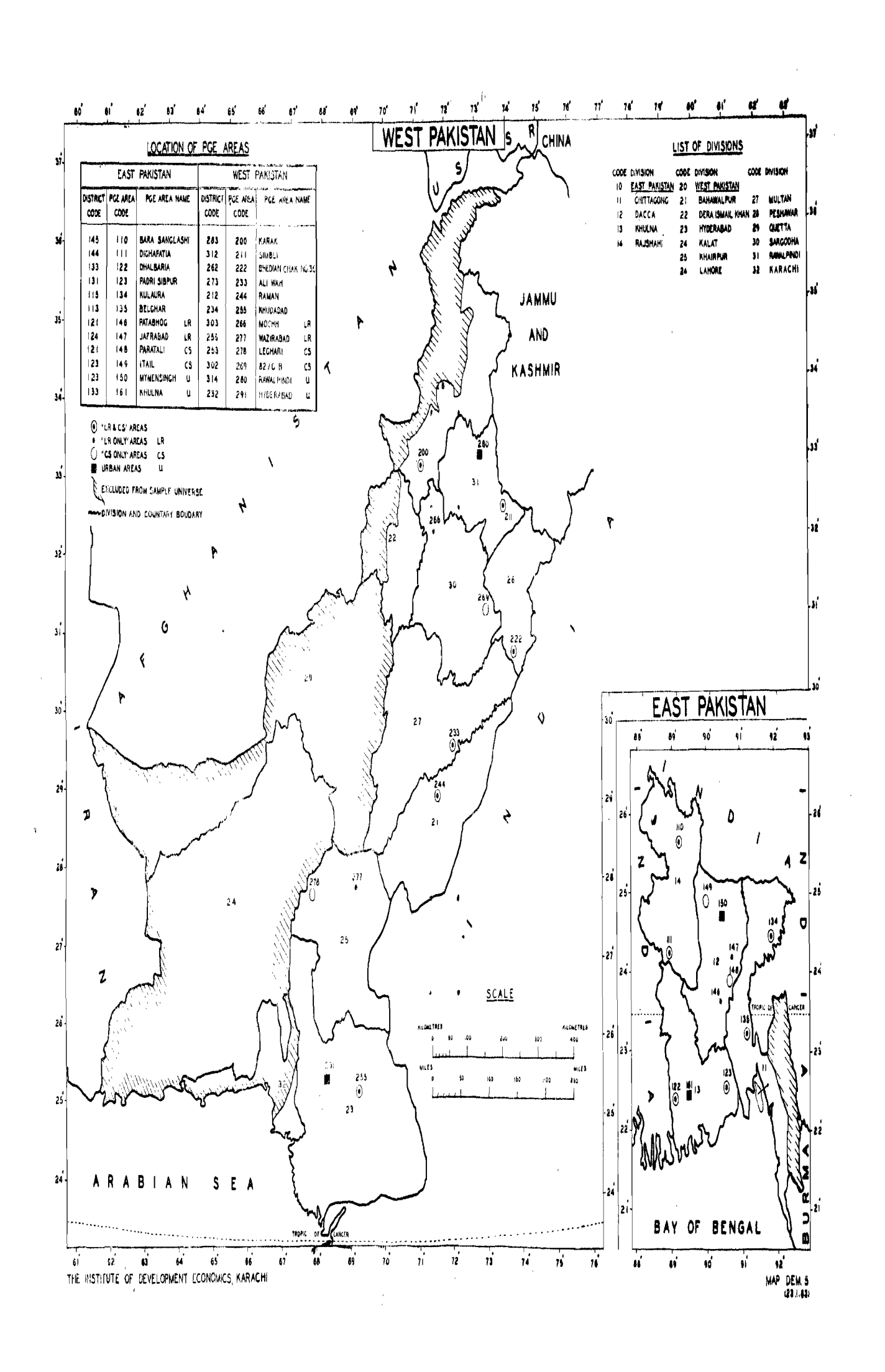
[28]. Government of Pakistan, Ministry of Finance, Economic Affairs Division, Central Statistical Office, *Population Growth Estimation: Non-Matching Analysis*. Special Studies Series PGE 6. (Karachi: expected date of first publication—June 1963).

	Cross-sectional Survey forms				Longitudinal Registration forms	
	Household composition form	Changes in household composition form	Enumerated vital events form		Birth register form	Death register form
			Births	Death		
Own address	×	×		×		×
Own name	×	×	×	×	×	×
Father's name	×	×	×	×	×	×
Grandfather's name			×		×	×
Husband's name				×		×
Mother's name			×		×	
Religion/caste	×	×	×	×	×	×
Relation to head of household	×	×	×	×	×	×
Sex	×	×	×	×	×	×
Age	×	×		×		×
Marital status	×	×		×		×
Whether pregnant*	×	×				
Own occupation	×	×		×		×
Father's occupation*					×	
Present or absent*	×	×				
Since when present or absent*	×	×				
Date of event			×	×	×	×
Order of birth			×		×	
Live birth or still birth			×		×	
Address where event took place if within PGE area			×	×	×	×
Name of midwife *					×	
Name of respondent*					×	×
Address of respondent*					×	×
Signature or thumb-impression of respondent*					×	×
Date of report*	×	×	×	×	×	×

Items marked with an asterisk in the stub of the table will not be used for matching purposes. It must also be remembered that the first two forms "Household Composition" and "Changes in Household Composition" are not intended for matching. Their purpose is to increase the enumerator's chance to discover more vital events.

Methodological Lessons

1). The first and most important lesson to-date was that vital events srate are in the first instance the function of the registrar's energy and only



EAST PAKISTAN				WEST PAKISTAN			
DISTRICT CODE	PGE AREA CODE	PGE AREA NAME		DISTRICT CODE	PGE AREA CODE	PGE AREA NAME	
145	110	BARA SANGLASHI		283	200	KARAK	
144	111	DIGHAPATIA		312	211	SIMBLI	
133	122	DHALBARIA		262	222	BHEDIAN CHAK NO.35	
131	123	PADRI SIBPUR		273	233	ALI WAH	
115	134	KULAURA		212	244	RAMAN	
113	135	BELGHAR		234	255	KHUDADAD	
121	146	PATABHOG	LR	303	266	MOOMH	LR
124	147	JAFRABAD	LR	255	277	WAZIRABAD	LR
121	148	PARATALI	CS	253	278	LEGHARI	CS
123	149	ITAIL	CS	302	289	82/G B	CS
123	150	MYMENSINGH	U	314	280	RAWALPINDI	U
133	161	KHULNA	U	232	291	HYDERABAD	U

CODE	DIVISION	CODE	DIVISION	CODE	DIVISION
10	EAST PAKISTAN	20	WEST PAKISTAN		
11	CHITTAGONG	21	BAHAWALPUR	27	MULTAN
12	DACCA	22	DERA ISMAIL KHAN	28	PESHAWAR
13	KHULNA	23	HYDERABAD	29	QUETTA
14	RAJSHAHI	24	KALAT	30	SARGODHA
		25	KHAIRPUR	31	RAWALPINDI
		26	LAHORE	32	KARACHI

THE INSTITUTE OF DEVELOPMENT ECONOMICS, KARACHI

MAP DEM. 5
(23.1.63)

much less effectively a picture of the underlying demographic forces. It was, therefore, necessary to design the straight-jacket of sectors, daily rations and routine rounds in order to control more effectively the registrars' day-to-day work.

2). It was found that inspecting officials, even of the highest calibre, when exposed to the hardships of moving in the less accessible areas of this country, fail to produce really comprehensive reports, sometimes fail even to contact the registrar or enumerator. Guidance has, therefore, been provided in the form of extensive forms for reporting.

3). Inadequate training was provided for the mapping task. For some inexplicable reasons existing maps were not used as base. As a result, it will take a year before maps are brought up to a standard, which will ensure that each PGE area is covered unambiguously and comprehensively.

4). Instead of one "daily ration" East Pakistan proposes to use two "half-daily rations". PGE areas in the East are so small (overall density seven times greater than in the West Wing) and communications so convenient, that the registrar can come back to his quarters for lunch.

5). So-called local advice—when tested is almost always wrong or at least incomplete. So are opinions of visiting officials in fields like distances, daily walking tasks (100 per cent differences between two advisers), *etc.*

6). There is a suspicion that enumerators do not investigate unnumbered dwellings. This is no doubt partly due to the comprehensiveness with which registrars keep inhabited dwellings numbered.

7). There is a strong tendency among registrars to be office-bound. There is an even stronger tendency for enumerators and Field Coordinators to be town-bound and, *e.g.*, hurry with the work, particularly when it is a question of carrying it or not carrying it over a week-end.

8). Naturally, cases of authorized cooperation, *i.e.*, collusion, between enumerators and registrars do not come easily to light. The opposite cases of conflict do. There have been several reports of enumerators (with the status of quasi-government servants) undermining the prestige of registrars whose connection with the government is more tenuous, particularly in East Pakistan.

9). The definition of parity (number of all children given birth to by a woman) was misunderstood in a number of PGE areas. It was not always

clear that only live births count and that the most recent birth is to be included.

10). For reasons not clear, a much wider definition of dwelling was adopted in East Pakistan than in West Pakistan. Occasionally so very much wider that it produced up to eight times more people per dwelling than in West Pakistan. This made for a swift numbering job with the standard placards, but left the "dwellings" (usually groups of dwellings centred around a courtyard or water point) very fuzzy at the edges. It is impossible to check in such a situation what structures are or are not included in any one "dwelling". Furthermore, it made useless, because too cumbersome, the so-called alternative procedure, according to which entrances to a dwelling apart from the main and numbered one were to be placarded with the same plates as the main entrances but given instead of the number the code ALT. Structural differences also entered in to complicate the problem. A number of hutments within a compound may in fact have only one outside entry and this is where the registrar affixed the dwelling number.

11). Written instructions in English are ineffective. Written instructions in vernacular languages may also be ineffective inasmuch as they do not convey the appropriate message. Instructions in English should nevertheless be produced to secure uniformity of approach among senior personnel. To the lowest echelons, they must somehow penetrate by word of mouth during training periods and frequent inspection trips.

12). Finally, there were several troubles of a minor nature which with greater foresight could have been avoided. *E.g.*, placards with numbers are sometimes used twice with a different number on each side. Having fallen off they may be put up showing the wrong side. Or, all ages change with time. It has not been made clear that these are not "changes" requiring the making out of a "Changes in Household Composition" form.

FINANCE

Total Cost, Budgetary Items and Sources

At this stage, it is not possible to indicate with any exactitude the total financial cost of the project. In particular, it is difficult to forecast immediately the costs likely to be involved in the analysis and interpretation of the data being gathered. On the basis of present experience in respect of certain major components of the project and forseeable expenditures connected with future operations, the estimated approximate costs will be: Initial non-recurring Rs. 10,000 for the Cross-sectional Surveys and Rs. 12,000

for Longitudinal Registration; and recurring per annum Rs. 95,000 for CS and Rs. 1,00,000 for LR. A rough breakdown of the latter two totals is as follows:

	CS	*LR*
Annual Expenditure	95,000	1,00,000
1) Pay and allowances of headquarters staff	25,000[a]	20,000
2) Pay and allowances of field supervisors	20,000[b]	17,000
3) Pay and allowances of field staff	25,000[c]	34,000
4) Travelling allowances and other miscellaneous expenditure	25,000	29,000

(a). This represents 15 per cent of the 1961/62 budget of the headquarters staff in the National Sample Survey Division.

(b). Cost of 1/4 time of Field Supervisors engaged, amongst other things, on PGE work.

(c). This represents cost of 1/2 time of 22 enumerators engaged, amongst other things, on PGE work.

In addition to the above, funds will also be required for setting up a unit for matching collected by the two parts of the experiment records, analysing the available information and setting out the findings in a useable form. The size and status of the staff likely to be required for this purpose cannot, however, be determined before the first phase of the survey which is now in progress has been concluded and some idea can be formed of the nature of work that will be involved in matching and other operations connected with this process. As a rough guess, a sum of Rs. 45,000 may be required to cover this part of the activity for a period of one year, commencing 1st January 1963. This provision will, however, need to be increased gradually in subsequent years.

An even more unknown quantity is the cost of the analysis of non-matching data. We collect it in order to ensure an extensive investigation of the households, in which we are interested, for the sole purpose of obtaining vital-events information. We would, however, think it a great pity if this wealth of information, even if accumulated as a by-product, was not used and analysed. The costs would depend on how ambitious a plan was to be undertaken, but it would probably not be worthwhile starting below Rs. 50,000 per annum.

Five-Year Cost

PGE is a research project of great significance and it ought to be possible to continue it sufficiently long so that its results may be established not only

to fill the existing gap of information about the rate of population growth in this part of the world, which undoubtedly is one of the most urgently needed type of data in Pakistan, but it is also hoped that PGE experience can prove of some methodological value to other underdeveloped countries of the world which need such information but which cannot in the foreseeable future set up nation-wide registration systems capable of yielding the desired information about their population growth. If both these aims are to be served adequately then we must plan to keep the experiment going for, say, five years. On this basis, the entire cost of all three parts of the experiment (Cross-sectional Surveys, Longitudinal Registration and Matching, *i.e.*, still excluding the Non matching analysis) could add up Rs. 1,250,000.

Cost per Vital-Event Certificate

Total cost on the Longitudinal Registrations over a 5-year period as estimated above comes to Rs. 512,000. During this period, a total of approximately 40,000 birth and death certificates are expected to be issued which means that the average cost of registering a birth/death is approximately Rs. 12.50 paisa.

Cost per Cross-sectional Survey Household

Altogether over 20,000 households are involved in Cross-sectional Surveys and the total cost over a 5-year period is estimated at Rs. 4,85,000. The average cost of collecting the requisite information through Cross-sectional Surveys for the total period of 5 years, therefore, works out to Rs. 24 per household.

Dilution of Field Intensity, Economics and An All-Pakistan Programme

At present a PGE area covers an approximate 5,000 population. In some cases it is a little less. The first desideratum is to make up these smaller areas to the uniform level of approximately 5,000 and action to that end is presently under consideration. It is hoped that, by the end of June 1962, all these areas will have the desired minimum coverage.

When the LR registrars and the CS enumerators have had sufficient experience and inspections indicate that the early teething troubles are over, then action can be taken to explore the possibility of extending the areas to cover the whole jurisdiction of a Union Council/Committee, on the average of approximately 10,000 population and perhaps reducing the Cross-sectional Surveys from four rounds to two in the year. These measures will cut the average cost of registration per certificate (or household in the case of the Cross-sectional Surveys) by approximately forty per cent. This action will, however, not be taken before the end of the current year, and during the intervening period of 6-7 months, attention will continue to be paid to pro-

cedural details in order to establish the experiment on a sound and firm footing.

CONCLUSIONS

Ideas Discarded

Some of the ideas already considered, but not used, have been described earlier, like the suggestion that Karachi should be a separate stratum, that there should be at least two sampling areas per stratum, that the existing systems of registration should be used.

There were also alternatives suggested for many other topics, considered and not adopted. The Managing Committee had to resist the temptation of expanding the content of the questionnaire. There is always an additional interest worth catering for. We had to refuse the suggestion to extend the space on the forms for "relation to head of household", because there just is not available to us the necessary anthropological expertise to collect in adequate form and then to deal with such expanded information. We further thought the available executive apparatus unequal either organizationally or analytically to further refinements like increasing the homogeneity of strata, increasing the homogeneity of the "LR only" and "CS only" strata in West Pakistan, use of families instead of households as reporting units and the like. We were urged to postpone the beginning of the experiment until all the problems of analysis have been worked out. We were strongly advised to space the CS visits every six months instead of every three months, but there is of course no evidence on the advantage of either period. We were against collecting too much detail, like recording the standard of training of midwives and against a too sophisticated sample design with, *e.g.*, diversified methodological purposes even if our sample were larger. We did not like the idea of enlarging the purpose of the sample with additional activities like registration of miscarriages and registering (by courtesy) of events outside PGE areas at requests of interested members of the public.

Finally, we had to guard the independence of the two parts of the experiment against even very minor infringements like the suggestion that details of the registration certificates should be recorded by enumerators on CS forms and the making of LR forms and CS forms similar to each other.

It would take up too much space to reproduce faithfully all the arguments which were used during the discussions over these points and we admit that the balance of the arguments was sometimes very even. We do not wish to claim that the Managing Committee took the right decision in each

case. Often *a* decision had to be taken. We merely wish to indicate some of the many alternatives which entered into our considerations and to save the labour of those friends who would like to advise us and make suggestions on points, on which advice and suggestions have already been amply received.

Ideas Pending

Apart from the ideas on which the PGE experiment is based presently and those already discussed above, but discarded, there is a host of possibilities at present under more or less active consideration. There is the large field of potential changes which look merely formal, but some of which, at least, could prove to be of deep substantive significance, like translating some forms and some instructions into vernacular languages, introducing visible signs of registrar's whereabouts and activities, like flags and badges (similarly for enumerators, provided their symbols are very different), accommodating international requirements[29] and conforming to a greater degree with generally accepted international standards[30], deciding whether at the beginning of each year the "Household Composition" form should be used or the "Changes in Household Composition" form and others.

We feel that it may be worthwhile and feasible to experiment with a number of new alternatives like employment of female enumerators and female registrars in some areas, use of part-time and honorary registrars in others or the same areas, rewarding members of the public for correct reporting, alert reporting, keeping placards with numbers *in situ*. Such curiosities have occurred to some of us like tracing the history of infants in order to obtain details of age at first walking. More urgent than new ideas are the loose ends in the existing procedures, which could well do with some tidying up, like general and ruthless substitution of registrars' quarters for offices, sharpening up of *de facto* and *de jure* definitions, improving the consistency of definitions about relations to head of household between the two parts of the experiment, systematizing contacts with official sources (hospitals, cemeteries, registration centres) as informational leads, improving the efficiency of the ALT procedure in multi-storeyed buildings with more than one household (numbering only the main entrance to a household and placarding with "ALT" *all* alternative entrances).

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[29]. *1*). United Nations, *Principles for a Vital Statistics System*. Statistical Papers, Ser. M. No. 19. (New York: 1953).

2). United Nations, *Handbook of Vital Statistics Methods, Studies in Methods*. Ser. F. No. 7. (New York: 1955).

[30]. Forrest E. Linder, "World Demographic Data", *The Study of Population. An Inventory and Appraisal*, edited by Philip M. Hauser and Otis Dudley Duncan, (Chicago : The University of Chicago Press, 1959), pp. 321-360.

Even though against expanding the content of the questionnaire and against diversifying further the sample methodologically, it is tempting to play with such alternatives, some of them simplifications, as abolition of the numbering of dwellings and substituting another system of addresses, differentiating between temporary and permanent migrants, obtaining more economic details, particularly about the head of the household.

There are further, such basic questions, like the optimum size of a PGE area relatively to considerations other than mere population size, the influence of the anti-malaria and family-planning campaigns on vital events and the role of the PGE experiment in both, the mode of periodic reporting on PGE findings, including the methodological lessons.

The probably largest unknown field is centred around the problems of analysis. By what variables should the information collected in the field be analysed and by which characteristics will the tabulations throw out (in)significant results. One cannot analyse on all the possible permutations of each and every variable. Should, *e.g.*, religious (and caste) differentials be obtained? There are further such obvious requirements like the one that there should be a greater integration of forms with analysis needs. Weights should be determined to calculate provincial and whole-country results in order to improve the estimates, but particularly to counterbalance overrepresentation of urban areas with their presumed predominance of *de facto* population, but shortage of *de jure* vital events. More effective means must be found for obtaining base population in areas where only the Longitudinal Registration part of the experiment is being conducted.

Parallel to the needs of the analysis of the substantive results of the experiment, there are ideas connected with various aspects of the methodological analysis. Village or even block registration results could be used as checks on the effectiveness of a registrar's coverage of all parts of his area. The allocation of the registrar's time could be analysed to determine the most effective sources of first intelligence. Field Inspectors and Senior Registrars must be trained to be more specific in their criticisms and to increase their training functions.

It is impossible to foresee in detail how the determination of the considerations described above will influence the PGE experiment. It is hoped that the outcome of our thinking, discussions and experience in the relevant connections will be reported on a suitable future occasion. In any case, the shape of the PGE experiment is likely to be moulded in the future by reference to these considerations.

Hopes For the Future

The current and immediate hopes for this experiment have been described in the introduction. There are also three minor aims which it is hoped it will be possible to achieve with the present system or only minor modifications to it. They are:

determining the optimum period of recollection;

determining the validity of the allegedly prevailing practice of young mothers having their children, at least their first children, in their own mothers' houses;

determining the degree of independence of the LR & CS parts of the experiment; for this last purpose four "LR only" and four "CS only" areas have been introduced; (there are thus in fact twenty four areas altogether: sixteen with both parts of the experiment, four "LR only" and four "CS only").