PAKISTAN GEOGRAPHICAL REVIEW

Volume 26 ... Number 1

January 1971

Pakistan Geographical Review

Vol. 26, No. 1 January, 1971

CONTENTS

The editors assume no responsibility for statements and opinions expressed by authors.

EDITORIAL AND BUSINESS OFFICES
DEPARTMENT OF GEOGRAPHY, UNIVERSITY OF THE PUNJAB
NEW CAMPUS, LAHORE.

Pakistan Geographical Review

Volume 26 January 1971 Number 1

PROSPERITY THROUGH UTILIZATION OF MINERALS[1]

S. A. BILGRAMI

POPULATION explosion appears to be the greatest problem facing the world today. With the increasing density of population a high degree of industrialization in all fields of life, particularly agriculture is essential if people the world over are to lead healthy lives. It is not generally realized that in the task of increasing food output the greatest contribution has to be made by the mineral industry. The ploughing, sowing and reaping of the harvests has to be done by machines, the increasing amount of fertilizer required for better crops and pesticides for their protection, the trucks and trains needed for the movement of fertilizers as well as the grains, all depend upon minerals directly. Increasing amount of water has to be found and pumped into the fields. For this we will need firstly to use sophisticated techniques for locating water-bearing area and then will have to use heavy machinery not only for drilling but also for pumping of water. All this will need industrialization based on the utilization of mineral resources.

With the increase of pressure upon mineral resources intensive technological efforts must be made for the utilization of lower grade ores and natural fuels. In the last forty years or so the average concentration of copper in the ores that are considered economic has fallen from a few percent to about 0.5 percent. This again means handling of larger tonnages of ore and hence usage of heavier machinery and equipment in turn using more metals which are the direct products of mineral industry.

It is generally thought that Pakistan is poor in mineral resources and hence cannot be self-sufficient in mineral products. As a matter of fact no country in the world is self-sufficient in mineral resources but this does not mean that the country cannot achieve a high degree of industrialization. The outstanding example of Japan

[1]Presidential Address: Geology, Geography and Anthropology Section, 21st—22nd Annual All Pakistan Science Conference, Rajshahi, 1970.

Dr. Bilgrami is Director, Pakistan Chrome Mines Ltd., Quetta.

TABLE 1—SHOWING PRODUCTION OF MINERALS IN PAKISTAN 1959—1967

Mineral	Unit	1959	1960	1961	1962	1963	1964	1965	1966(*b*)	1967
Aragonite ...	Tons	2,796	5,245	4,921	2,223	7,174	9,736	10,456	9,224	15,946
Celestite ...	,,	664	1,332	412	288	379	265	444	632	398
Chromite ...	'000 Tons	16	18	25	21	14	13	14	26	27
Coal ...	,,	723	818	906	979	1,223	1,193	1,212	1,409	1,290
Dolomite ...	,,	...	151	346	509	648	708	614*	489	670
Fireclay ...	,,	14	16	16	10	35	17	16	17	18
Fuller's earth ...	,,	...	1	10	9	13	7	11	12	21
Gypsum ...	,,	97	90	100	179	195	192	147	100	111
Limestone ...	,,	927	1,073	1,197	1,154	1,651	1,968	1,912	1,474	1,613
Iron Ore ...	,,	2	5	4	...	...	5	2	+5	...
Magnesite ...	Tons	396	434	160	300	864	607	515	569	1,077
Maganese ...	,,	29	292	...	925	1,387	980	500*	124	1,345
Rock Salt ...	'000 Tons	157	181	198	192	239	194	266	237	346
Silica Sand ...	,,	22	26	13	17	23	26	31	48	62
Soapstone ...	Tons	2,340	3,370	1,215	1,102	1,840	2,519	2,799	3,117	2,607
Barytes ...	,,	508	633	110	2,595	4,435	11,817	8,748	7,519	6,050
Natural gas ...	Million cft.	22,365	29,842	34,665	42,076	49,459	59,100	60,700	17,033	83,425
Crude Oil ...	Million I.G.	82	92	99	117	123	131	138	130	127

SOURCE—Central Statistical Office. (*a*) Data relates to nine months. (*b*) Production figures for the year 1966 are provisional and include three months' provisional data in June to March. (*c*) Includes ordinary marble also. *Provisional.

has clearly demonstrated that men and not materials alone can develop a country. Pakistan is fortunately not so poor in her mineral resources as is generally believed. We have large reserves of coal, iron ore, halite, natural gas, cement, raw materials, gypsum, barite, volcanic rocks, chromite and decorative stones, all of which can be utilized for the economic well being of the nation. It is beyond the scope of this address to deal in detail with the uses to which each of these minerals can be put but I will only refer to their utilization in many countries of the world.

The Present Status of Mineral Industry

Before coming to the main theme of this address it is pertinent to make a few observations on the present status of mineral industry in Pakistan. The contribution of this industry to the GNP was 0.1 percent in 1949/50, 0.2 percent in 1958/59 and 0.3 percent in 1967/68. These figures give a very misleading impression of the significance of the mineral industry, since these do not include Rs. 540 million, saved during 1958—1968 as a result of replacement of fuel oil by natural gas, and Rs. 213 million, worth of cement exported. Even if the above savings and earning are not taken into account we should consider whether without mineral products (natural gas, cement, artificial fertilizer, pesticides, chemicals, plastics, decorative stones, etc.) we could have made the same industrial and agricultural progress that we did and if yes, at what additional cost ?

From Table 1 which gives the production of minerals from 1959-1967 it clearly emerges that large-scale production of only twelve minerals namely, aragonite (marble), coal, chromite, dolomite, fire clay, fuller's earth, gypsum, limestone, rocksait, silica sand, natural gas and crude oil is being carried out in Pakistan. Of these, the production of coal has remained more or less static over the past four years. This is because of no demand. Here a clear example can be cited from WPIDC collieries where the production capacity is far in excess of the actual production which has been restricted due to no demand.

The following figures illustrate the point :

Table 2—Showing production of Coal from WPIDC Collieries in 1000 tons.

Central		Block	Degari	Sharigh	Makerwal	Total
Base Year :						
1964-65	...	47.7	28.0	27.2	187.8	291.7
1965-66	...	52.5	39.0	38.0	164.5	294.0
1966-67	...	48.8	50.5	31.8	201.4	332.5
1967-68	...	101.1	76.8	58.0	217.5	453.4

Source : AsTable 1.

The production from these mines showed marked increases in 1966-67 and again in 1967-68 but resulted in accumulation of large stocks at the WPIDC mines. These mines are expected to produce 3,050 tons per day by 1975. What will happen to this coal when mined, is another matter. The primary concern seems to be production and not utilization. WPIDC are to be congratulated for having taken concrete steps for the utilization of coal produced from their mines. A briquetting plant is already working in Quetta and another one is expected to go into production sometime this year. Also plans for setting up of a low temperature carbonization plant at Quetta are in advanced stages of implementation. It is hoped that this plant, when in operation, will completely change the face of Quetta town.

Chromite production has fluctuated considerably partly due to no demand and partly due to working conditions in the mining areas which are choking this industry to death. The production of fire clay and fuller's earth has shown considerable variations and again illustrates the unstable working conditions and erratic demand. Limestone production has also shown the same trend and the variation may be due to lack of demand from the cement industry or the railways who use it as ballast.

Natural gas has shown a steady increase in production primarily because of gradual shifting of factories and power-houses from fuel oil or coal to natural gas. It would be appropriate to consider this increase as destructive rather than constructive since it is a criminal wastage of a valuable natural resource to burn the gas when extensive coal fields exist.

Complete data on the investment in mining industry by the private sector is not available and again illustrates what little attention this industry receives. In the government financed sector, however the total development outlay on minerals and fuels amounted to Rs. 155.25 million from 19 5 to 1967. The revised allocation for minerals and fuels in the Third Five Year Plan is Rs. 592 million or 1.9 percent of the total development expenditure in the said plan, which is a very insignificant amount. But if from the total development allocation, expenses on oil and gas exploration, gas transmission, geological survey and research are taken out then minerals and solid fuels will get less than 0.4 percent of the total development allocation in the current plan. As against this, 13.2 percent will go to agriculture and twenty-six percent to water and power. A slight economy in these two sectors can make available large sums of money for the development of mineral resources.

Coal

Pakistan has very large reserves of coal which at the present rate of exploitation will last for centuries. But then the present rate of exploitation is negligible and unless we develop our coal mining industry speedily and on proper lines we

cannot hope to establish heavy engineering complexes in the country. A sweeping statement is generally made that West Pakistan coal deposits are of low grade and hence useless for all purposes except burning in brick-kilns. Nothing can be farther from the truth. We are living in an age of technological revolution and increasing quantities of low grade minerals including fossil fuels are being used. As a matter of fact in a number of cities in Europe, U.S.A., and Canada even city garbage is being used to generate steam for space heating and electricity. Our coal deposits are at least of the same grade as some of the coal being extensively used in other countries of the world. Production of lignite in four countries which are not too highly industrialised is given below :—

TABLE 3—SHOWING PRODUCTION OF LIGNITE IN 1000 SHORT TONS.

	1960	1961	1962	1963	1964
India ...	52	71	233	1,093	1,729
Turkey ...	3,760	4,159	4,668	5,501	6,367
Greece ...	2,747	2,760	2,971	3,836	4,193
Spain ...	1,942	2,303	2,743	2,856	2,838

SOURCE: Mineral Year Book, Vol. II, U.S. Bureau of Mines, 1964, pp. 156-57.

The above figures clearly demonstrate that the use of lignitic coal is on the increase even in those countries which have huge reserves of high grade coals.

Data on the coal fields of Pakistan are presented in Tables 4 and 5. Some doubt has been expressed on the possibilities of using the peat deposits of East Pakistan and hence data on these deposits have not been included in Table 4. These deposits have a reserve of 1000 million tons of wet, or 143 million tons of dry peat and have a calorific value of 6000 to 7000 B.T. Us., per pound.

The most important use of coal the world over is for generating power. In U.S.A., per capita annual consumption of energy is equivalent to 8.58 tons of coal ; in Europe and the USSR it is 2.5 tons ; in Japan one ton and the rest of Asia where more than half of the world's population lives the coal consumption is about 150 lbs. per year per person. This is about the quantity consumed in the U.S.A. per person in less than three days.[2]

Significantly enough, increasing quantities of lignite are being used in U.S.A. for power generation despite the availability of better quality coals, natural gas and nuclear fuels. Table 6 gives the consumption of lignite for power generation in five States of U.S.A.

[2] E. W. Miller, "World Patterns and Trends in Energy Consumption", *The Journal of Geography*, Vol. LVIII, No. 6 (1959), pp. 269—279.

TABLE 4—DATA ON MAJOR COALFIELDS OF PAKISTAN

S. No.	Name	Area in Sq. Miles	Variation in Thickness of Workable Coal Seams in feet			Composition						Production in Long Tons 1965-66	Known Reserves in Million Long Tons
			Max.	Aver.	Min.	Moisture %	Volatile Matter%	Fixed Carbon%	Ash%	Sulphur %	Calorific Value B. Th. U.		
1	Makerwal	30	10	5	2	4.2 to 6.0	37.1 to 44.9	36.0 to 43.0	7.0 to 21.0	4.0 to 5.6	9,550 to 11,850	191,336	19
2	Salt Range	100	5	2.5	1	3.2 to 7.6	26.3 to 38.8	29.8 to 44.8	12.3 to 37.7	3.5 to 10.7	7,100 to 11,100	240,897	75
3	Ror Range-Degari	18	10	4	1	15.9 to 18.7	33.5 to 39.8	36.0 to 42.0	3.0 to 13.0	0.5 to 5.6	9,000 to 11,000	470,339	25
4	Khost-Sharig-Haranai	80	5	2	1	4.0 to 11.4	34.8 to 45.3	25.5 to 43.8	9.3 to 34.8	5.0 to 7.1	8,500 to 12,400	108,412	40
5	Mach	16	5	3	1	7.1 to 12.1	34.5 to 39.4	32.4 to 41.5	9.6 to 20.3	3.2 to 7.4	9,200 to 10,300	68,300	15
6	Lakhra	80	8	4	2	31.8 to 35.7	28.0 to 30.8	26.8 to 30.0	7.4 to 10.5	3.3 to 6.0	7,010 to 7,660	21,371	240
7	Meting-Jhimpir	35	3	1.5	1	15.4 to 29.8	29.8 to 39.8	31.0 to 36.3	8.2 to 14.6	3.4 to 7.4	7,400 to 9,800	63,582	28
8	Jamalganj (Rajshahi-Bogra)	45	146	—	5	—	20.0 to 39.0	33.0 to 54.0	10.0 to 60.0	0.6	12,095 to 12,297	—	1,600
	Total												2,042

SOURCE—Fuel Map of Pakistan

TABLE 5—UNDEVELOPED COALFIELDS OF WEST PAKISTAN

Index No.	Name of Coalfield	Coordinates		Remarks
C-1	Abi-Gum	29° 40′ 00″	66° 45′ 00″	about 8 miles off Mastung.
C-2	Badinzai	31° 12′ 00″	69° 08′ 45″	in the Sarkai Shila about 1½ miles WNW of Zhizgai Killi and 20½ miles SW of Ft. Sandeman.
C-3	Bahlol	30° 14′ 30″ to 69° 34′ 30″	30° 14′ 00″ to 69° 36′ 00″	abcut 1 mile north of Bahlol. about 1 mile southeast of Bahlol.
C-4	Bala Dhaka	30° 04′ 00″ to 69° 25′ 00″	30° 04′ 15″ to 69° 26′ 15″	about 2 miles north of Bala Dhaka. about 2 miles northeast of Bala Dhaka.
C-5	Balgor	25° 53′ 00″ to 64° 11′ 00″	25° 57′ 00″ to 64° 14′ 00″	about 70 miles east of Turbat.
C-6	Cherat	33° 51′ 50″ to 71° 54′ 20″	33° 53′ 20″ to 71° 53′ 50″	about 1 mile southeast of Bakhtai. about 1 mile southeast of Jabba Khattak.
C-7	Choi	33° 43′ 45″ to 72° 13′ 00″	33° 52′ 45″ to 72° 15′ 15″	about 2 miles north of Choi. about 1 mile southeast of Mongi Wali.
C-8	Dukki	30° 08′ 10″ to 68° 30′ 30″	30° 08′ 00° to 68° 35′ 45″	about 2 miles southwest and southeast of Dukki respectively.

Table 5—(*Contd.*)

Index No.	Name of Coalfield	Coordinates		Remarks
C-9	Johan	29° 18′ 30″	29° 20′ 20″	about 6 miles southeast of Johan.
		to	to	
		66° 52′ 40″	66° 55′ 15″	about 3 miles northwest of Johan.
C-10	Katch	30° 30′ 15″	30° 21′ 10″	
		to	to	
		67° 09′ 00″	67° 10′ 15″	
C-11	Khilla Muzaffarabad	34° 21′ 00″	34° 22′ 00″	
		to	to	
		73° 31′ 00″	73° 30′ 00″	
C-12	Kotli	33° 26′ 00″	33° 38′ 00″	Karela to Tali.
		to	to	
		74° 07′ 00″	73° 57′ 00″	
C-13	Margat	30° 07′ 00″	67° 19′ 00″	
C-14	North of Abigum	29° 54′ 45″	29° 56′ 30″	
		to	to	
		67° 27′ 00″	67° 27′ 00″	
C-15	Pirsimail Ziarat	30° 30′ 00″	30° 04′ 00″	
		to	to	
		67° 21′ 00″	67° 26′ 00″	
C-16	Sylhet	25° 13′ 00″	91° 13′ 00″	

SOURCE—Fuel Map of Pakistan.

TABLE 6—SHOWING CONSUMPTION BY ELECTRIC UTILITIES AND SHIPMENTS BY PRODUCERS TO RETAIL DEALERS AND OTHER CONSUMERS OF LIGNITE IN THE U.S.A., 1963, IN 1000 SHORT TONS.

State		Utility plants	Retail dealers	All other uses	Total
Minnesota	...	406	6	241	653
North and South Dakota	...	963	407	299	1,669
Montana and Wyoming	...	304	...	6	310

SOURCE : Lignite, U.S. Bureau of Mines Bulletin 630, Minerals Facts and Problems 1965, p. 7.

From these figures it appears that there is little justification for not using our coals for power generation. It is argued that natural gas is cheaper than coal and as such should be preferred for power generation. Burning natural gas for power generation is like using furniture for cooking food and as such should be stopped. I will deal with the utilization of gas separately elsewhere.

Vigorous efforts are being made in Pakistan to convince all concerned that our future lies with nuclear energy. Three arguments are advanced in favour of preferring nuclear energy to conventional power generation by natural fuels : —

1) Our resources for hydro or coal based power generation are so limited that we cannot supply even fifty percent of our future requirements by these methods of power generation.

2) Since no industry in the country "including those whose basic raw materials are produced in Pakistan like jute and cotton textiles are internationally competitive or economic" we can establish nuclear power plants as well.

3) Nuclear energy competes with coal and natural gas in U.S.A. and U.K., and therefore should be established in Pakistan also.

Before commenting on these arguments I must make it clear that I am not against nuclear power and am convinced that in future the bulk of the world's power supply will have to come from nuclear or solar energy. But at the moment I feel that inadequate data have been taken into consideration for the calculation of our coal resources. Also, nuclear power plants are being established in Pakistan in densely populated areas where coal can be easily and cheaply supplied.

From Table 4 it will be seen that total coal resources in West Pakistan are 442 million tons. Since our rate of exploitation of coal is very small, extensive survey for new coalfields or the extension of the known ones has not been made. On the

basis of my personal knowledge of the West Pakistan coalfields I am sure the figures of reserves given in Table 4 can be multiplied by five, possibly by twenty. The estimate will further increase when the reserves of minor coal fields are determined. A look at the geological map of West Pakistan will reveal extensive areas occupied by eocene rocks which on investigation may prove to be coal bearing. It is therefore my submission that our proved coal reserves alone in West Pakistan can supply at least 10,000 million kilowatts of power for the next thirty years.

In East Pakistan the situation is even better. There are over 1,600 million tons of proved reserves of high grade coal which can supply the bulk power needs of the province for the next thirty years. I feel that it is detrimental to the country's best interests that instead of developing these coal fields we are concentrating on developing nuclear power in East Pakistan.

Costs of Power Generation

It is argued that coal transport is expensive and hence its use for power generation is uneconomic. But why transport coal at all? Power houses can be installed near the coal fields and extra high voltage power lines can be run from these generating stations.

In calculating the cost of power generation we must take into account one very important factor—that of employment. Coal-based power-houses in the country will mean a flourishing mining industry and provision of jobs to hundreds of thousands of people. It also will mean development of a large number of supporting facilities like railways, roads, workshops, hospitals, schools, welfare centres etc., all of which will provide additional jobs and a balanced development in the country. Establishment of nuclear plants which will be run by a few highly qualified engineers and technicians may result in massive unemployment and hence generation of poverty, disease and social evils on a large scale. The cost of maintaining these people who would otherwise have been usefully employed should also be added to the cost of nuclear energy to see if it is really economic.

It is reported that 20—22 cents per MMBTU, is the break even point of nuclear fuel and coal. By the end of 1967 the USAEC began to wonder about the supplies of uranium oxide in the years ahead, at anything close to today's price of US $ 8 per pound. It is estimated that US nuclear power generation capacity may be in the region of 120—170 million kilowatts in 1980 requiring 250,000 tons of U_3O_8. There is no guarantee that this quantity will be available at economic prices.

Safety considerations, thermal pollution and lowering of radiation exposure levels in mines have led to an increase of thirty to fifty percent in the cost of nuclear plants in the last two years. "Dr. Edward Teller has warned that the breeder reactor,

now USAEC's pet might be too hazardous and not worth the risk even after development (on which AEC plans an expenditure of some US $ 2 billions) on previous types, more than half dozen of which were quietly knocked on the head in 1967".[3]

It is significant that largest thermal power generating unit ever ordered anywhere will be coal fired. The 1.3 million kilowatts unit being installed by T.V.A., is scheduled for operation in 1972.

It is claimed by the exponents of nuclear energy that fast breeder reactors will make nuclear energy cheaper. In a recent meeting of the New York Section of the American Nuclear Society Dr. Edward Teller stated that "For the fast breeder to work in its steady state breeding condition, you probably need something like half a ton of plutonium. In order that it would work economically in a sufficiently big power producing unit, it probably needs quite a bit more than one ton of plutonium. I do not like the hazard involved. I suggested that nuclear reactors are a blessing because they are clean. They are clean as long as they function as planned, but if they malfunction in a massive manner which can happen in principle, they can release enough fission products to kill a tremendous number of people. If you put together two tons of plutonium in a breeder, 0.1 percent of this material could become critical. Although I believe it is possible to analyze the immediate consequences of an accident, I do not believe it is possible to analyze and foresee the secondary consequences. In an accident involving a plutonium reactor, a couple of tons of plutonium can melt. I don't think anybody can foresee where 1 or 2 or 5 percent of this plutonium will find itself and how it will get mixed with some other material. A small fraction of the original charge can become a great hazard". He also said that "altogether the fast breeder has resisted the head-on attack of our best technological people for twenty years. I doubt it will become a success very soon".[4]

It would appear from the above that all is not well with nuclear energy and while as we should not shun it all together we must keep our eyes and ears open. Also because of the potential hazards the nuclear plants should be sited away from the most densely populated areas and not within them as we are doing now.

Comparison with U.S.A.

It is really fallacious to compare the power industry in U.S.A., with that in Pakistan. First of all U.S.A. is self sufficient in nuclear fuel, technical skills, manpower and manufactures her own power plants. She has an elaborate network of communications, medical facilities and transport system all of which can be mobilized up in case of an emergency. Apart from the fact that by establishing

[3]*Coal Age* (February, 1968), p. 53.

[4]*Ibid.* (November, 1967), pp. 42—44.

nuclear power houses we will not develop our coal mining industry and will be dependent for nuclear fuel on others and import it on high prices we will also open the gates to possible major disasters. The malfunctioning of the thermal power plants of Multan and Lyallpur should serve as a warning that when this can happen in the case of comparatively simple power houses it can also happen in rather complicated nuclear power-houses.

Some Other Uses of Coal

Fly Ash

It is often argued that one big snag in the large scale consumption of coal is the disposal of ash. Recent experiments on industrial scale have clearly demonstrated that pulverised fuel ash or fly ash as it is called can be used in many ways which will save cement and also reduce the cost of power generation. It is used for stowing in the mines, in concrete mixes, in construction of soils, in fighting mine fires, for improving the quality of cement mixes, for air proofing, for structural fills etc. It has been demonstrated on a number of projects in U.S.A., that in addition to being superior to cement mixes, fly ash can be delivered in ready mix plant at about U.S. $5.00 per ton as compared to U.S. $20.00 per ton of Portland cement. The saving amounts to U.S. $1.00 per cubic yard.

Liquid Fuel from Coal

Recent experiments in U.S.A. have shown that liquid fuel can be extracted from coal at about fifty percent of the cost of natural oil. A contract valued at $ 3.775 million was awarded to Dravo Corporation by the Consolidation Coal Co., U.S.A., for building of a pilot plant at Cresap., W. Virginia, for converting coal to liquid fuel. This plant will produce fifty barrels of liquid fuel per day.[5] The whole sale cost of 100 octane gasoline from this plant will be about eleven per gallon which is competitive with the present cost of gasoline from petroleum. Our coals being high in volatile matter will probably be found very suitable for this purpose. Imports of fuel in Pakistan were about Rs. 109 million. in 1954 but increased to Rs. 446 million. in 1963/64. The import of petroleum alone has increased from Rs. 75 million in 1954-55 to Rs. 404 million in 1963. Replacement of a part of this liquid fuel by that derived from coal can lead to substantial savings in foreign exchange. Also coal worth Rs. 45 million is being imported, mostly in the East wing. These imports can be replaced by our own coal if the newly discovered coal fields of Rajshahi and Bogra are exploited. Also, we can export surplus coal.

Carbonization

Thermal processing of coal in ovens in the absence of air is called carbonization. This process yields a liquid fraction containing tar and other basic chemicals, gas

[5] *Mining Journal*, No. 6798 (1965), p. 414.

char or coke. Carbonization of lignite produces char, rather than coke. Pakistani coals are lignitic to sub-bituminous and hence on carbonization, coal from some of our coalfields will yield coke while from others char will be obtained. The coke is used for metallurgical purposes while char is converted to briquettes.

After carbonization the char residue settles at the bottom of the oven, is cooled by recycled carbonization gas and discharged. A mixture of gas and tars is drawn off. After the removal of dust and tar the gas is recycled to the carbonizer for supplying heat for the process. Water is separated and other condensates are distilled into liquid fraction and pitch residue. The distillates are used as wood preservatives and pitch used for briquettes. Sulphur and motor spirit are also recovered in many plants now in operation in U.S.A. Our coals being high in volatile matter are most suitable for large-scale manufacture of pipe line gas, tar and other products of coal distillation.

Activated Carbons

Our coals can be used as a source of activated carbon since one plant in Texas is using lignite for this purpose. Activated carbon is used for water treatment, decolorising solutions, gas absorption, extraction of iodine and recovery of gold.

Pipe Line Gas

Large-scale use of coal for pipe line gas has been demonstrated to be economic in large pilot plants by U.S. Institute of Gas Technology and U.S. Bureau of Mines. In Great Britain the gas Research Board has made similar demonstrations.[6] With the availability of a large quantity of indigenous coal, efforts should be made to manufacture coal gas in those towns where natural gas cannot be taken. This will result in preservation of our extremely meagre forest wealth.

Road Binder

It has been demonstrated that hydrogenated coal provides a road binder which is more economical and just as practical as asphalt. This road binder has a lower temperature suspensibility, and lower volatility and greater resistance to change than the road tars now in use. This road binder can be produced at about twenty five per-cent of the cost of road-tar.[7]

Sewage Treatment

It has been demonstrated at District of Columbia's Blue Plains water pollution control plant that coal removes contaminations more effectively than the conventional two stage sewage-treatment methods including highly refined activated sludge process. Five tons of coal are needed for every million gallons of sewage treatment and the coal can be reused for power generation.[8]

---

[6]*Ibid.*, (January, 1966), pp. 66—70.
[7]*Ibid.*, (August, 1965): p. 46.
[8]*Ibid.*, pp. 46-47.

TABLE 7—DATA ON OIL

S. No.	Name	Discovered	Structure	Producing formation	Age	Lithology
I.	Khaur	1915	Anticline	Murree Sakesar	Mid. Miocene Mid. Eocene	Ss Ls
II.	Dhulian	1937	Do.	Murree Sakesar Khairabad Datta	Mid. Miocene Mid, Eocene E. Eocene Jurassic	Ss Ls Ls Ss
III.	Joya Mair	1944	Do.	Sakesar	Mid. Eoc.	Ls
IV.	Bakassar	1946	Do.	Bhadrar Sakesar	Mid. Eoc.	Ls
V.	Karsal	1955	Do.	Bhadrar	Mid. Eoc.	Ls
1	Sui	1952	Do.	Sui Main Ls	E. Eoc.	Ls
2	Zin	1953-54	Do.	Do.	Do.	Ls
3	Uch	1955	Do.	Do.	Do.	Ls
4	Khairpur	1956	Do.	Do.	Do.	Ls
5	Mari	1957	Dome	Habib Rahi Ls	Mid. Miocene	Ls
6	Mazarani	1958	Anticline	Sui Main Ls	E. Eoc.	Ls
7	Jacababad	1958	Do.	Do.	Do.	Ls
8	Kandkhot	1959	Do.	Do.	Do.	Ls
9	Sylhet	1955	Do.	Boka Bil	E. Mioc.	Ss
10	Chhatak	1959	Do.	Bhuban	Do.	Ss
11	Rashidpur	1960	Do.	Boka Bil Bhuban	Do.	Ss
12	Kailastila	1962	Do.	Boka Bil Bhuban	Do.	Ss
13	Habiganj	1963	Do.	Boka Bil	Do.	Ss
14	Titas	1964	Do.	Bhuban	Do.	Ss
Total						

SOURCE—Fuel Map of Pakistan

AND GAS FIELDS OF PAKISTAN

Quality	Daily Production (Barrels) 1965	Producing Wells	Reserves
Oil : (30° & 36°) Api	31	3	
Oil : (34° to 45°) Api	5300 lbs oil 15 mill. cft gas	11	
Oil : (16°) Api	450	1	40 Million Barrels (Conservative)
Oil : (25° & 40°) Api	3000	7	
Oil : (36°) Api	negligible	1	
Gas : 88.52% Methane	125 mill. cft.	6	in mill. mill. cft. 6.3
Gas : 46.1% Methane	—	—	0.1
Gas : 27.3% Methane	—	—	2.5
Gas : 12.2% Methane	—	—	1.0
Gas : 66.2% Methane	—	—	5.0
Gas : 87.0% Methane	—	—	0.03
Gas : 25.0% Methane	—	—	Very Small
Gas : 79.2% Methane	—	—	0.2
Gas : 95.4% Methane	19 mill. cft.	4	0.28
Gas : 99.05% Methane	.5 mill. cft.	1	0.02
Gas : 99.05% Methane	—	—	0.74
Gas : 99.0% Methane	—	—	0.38
Gas : 96.0% Methane	—	—	1.3
Gas : 97.0% Methane	—	—	1.0
			18.85

There are a number of other uses of coal (fertilizer material, coal burning turbine engines run on pulverised coal source of sulphur etc.) which I have not mentioned. I only wish to draw attention to the possibilities that large reserves of our coal deposits offer and the little that has so far been done for their utilization.

Natural Gas

Table 7 gives the reserves and analyses of our known gas fields. It has been repeatedly stated by persons in responsible positions that our gas reserves are "inexhaustible". The position is quite the reverse. In fact our gas reserves are so small as to be considered negligible as compared to some other countries. Our known reserves are equivalent to only two years consumption of the U.K. It is therefore absolutely essential that we make all possible efforts for conserving our gas reserves instead of using them for destroying the Coal Mining Industry.

Most of our natural gas is being used as fuel for factories, power-houses and homes. Increasing quantities are now being used for fertilizer production and for synthetic fibre. In determining the use to which a particular mineral will be put all possible care should be exercised to see that maximum benefit is derived from that mineral.

a) In West Pakistan we are short of coal suitable for metallurgical purposes. Natural gas is being extensively used in place of coke in several countries of the world. We are yet to establish our steel mills in West Pakistan and part of the gas reserves should be set aside for these mills.

b) Natural gas is liquefied and used as a substitute for petroleum. Since we are importing large quantities of liquid fuel substitution of the imported fuel by liquefied gas will result in substanial foreign exchange savings.

c) Natural gas can also be used for manufacture of synthetic fibre, P.V.C. plastic, synthetic rubber, etc.

d) The phenomenal increase in our food production shows that we are using increasing quantities of fertilizers though our present consumption is about one-sixtieth of that in Japan and less than one-twentieth of that in Western Europe. It is thus evident that if we are to achieve and maintain self-sufficiency in food our artificial fertilizer production and consumption will have to be substantially increased. It is estimated that at least thirty percent of our gas reserves should be set aside for fertilizer production

From the above it is clear that establishment of new power houses and factories on natural gas should be banned. In fact no industry that can be run on other fuels should be based on natural gas.

Gypsum

West Pakistan has very large reserves of gypsum and anhydrite Though no estimates of proved and probable reserves are available it can be safely said that there are about 500 million tons of proved and over 1000 million tons of probable gypsum and anhydrite reserves in West Pakistan. From the production figures given in Table 1 it will be seen that at the present rate of exploitation these deposits will last for centuries. Most of our gypsum is being used for manufacture of cement and artificial fertilizer. Little use is being made of this valuable mineral for the manufacture of sulphuric acid or as a building material in Pakistan. It is estimated that in U.S.A., over ninety percent of all gypsum mined is used as a building material particularly for the manufacture of wall board, exterior sheathing and plaster. In the years to come increasing quantities of gypsum will be needed for the manufacture of artificial fertilizer, wall boards and tiles etc., and for curing of soils. It would be highly desirable if all the gypsum deposits of the country are investigated in detail and efforts are made to connect these by roads and railway lines wherever economically possible.

Limestone

Limestone and other cement raw material resources of West Pakistan are practically unlimited. These offer us enormous scope for exporting cement. In fact we can capture the world cement market. Here two proposals should be considered :

Lime mortar

I feel that serious thought should be given for shifting most of our construction work from cement to lime mortar. In addition to reducing the cost of construction this will make available large quantities of cement for export.

Export Oriented Cement Industry

It is said that our cement prices are high and cannot compete in the international market. This is probably due to the small size of our cement manufacturing plants. It is suggested that large cement factories are established along the coast for the specific purpose of exporting cement. Costs of production can easily be worked out to determine the size of the plant at which our cement will become internationally competitive. To overcome the shortage of foreign exchange for these export oriented cement factories foreign exchange can be loaned to these factories and they will repay this foreign exchange, from their earnings.

Iron Ore

Our known iron are reserves ore of the order of 400 million tons. For years now we have been making feasibility studies of setting up a Steel Mill based on

indigenous ore but we still do not seem to be convinced about the justification of this vital project. I do not know all the highly technical details that have to be taken into consideration before deciding whether or not a Steel Mill based on our own iron ore is feasible but I do want to emphasize that certain projects have got to be executed even if not found strictly economic in the ordinary sense of the word. Here again I must restate that normal cost calculations do not take into consideration the fact that large scale mining and smelting of the ore will provide employment to thousands of people and will lead to an over all balanced development of the areas where the mining and utilization will be done. Also, large mines provide an excellent training centre for many technical skills like electrical and mechanical engineering, carpentry, foundry, masonry etc.

It is about time that we made up our minds whether or not we want to continue to depend upon imports for our most strategic requirements. I am confident that viewed in this light a Steel Mill based on our own iron ore are will be found feasible.

Decorative Stones

Pakistan has practically unlimited reserves of decorative building stones. Marbles of varying colours and some with intricate multi-coloured designs on them, are found in Chagai, Peshawar, Rawalpindi and Hazara districts and Dir, Swat and Chitral States. In other northern areas also there are large deposits of marbles of various colours and designs.

Harder decorative building stones like granite, diorite, syenite, gabbro, etc. are found in practically unlimited quantities in Chagai, Peshawar and Hazara districts and Zhob, Malakand, North and South Waziristan and Mahmand agencies. Some of these stones are of unusual beauty and offer excellent prospects for exports.

There is insufficient appreciation of the value of decorative building stones as a source of foreign exchange with the result that this industry is rather neglected. Machinery and spares for cutting and polishing of these stones have to be imported on bonus vouchers and this makes the industry uneconomic. Given proper facilities, cutting and polishing of decorative stones can become a flourishing industry and an important source of foreign exchange.

Chromite and Barite

Chromite deposits occur in Zhob, Malakand, Mahmand, North and South Waziristan Agencies. Of these, the Zhob valley deposits have been worked for over sixty-five years and have produced about two million tons of chromite. Malakand deposits are of very limited extent and are being worked on small scale. Little is known of the other chromite deposits. No reliable estimates of the total reserves of

our chromite deposits are available but it can be safely said that the Zhob valley deposits alone may well be over five million tons. At the present rate of extraction of 25,000—30,000 tons a year, these deposits will last almost 200 years. Only about five percent of the total chromite production is being used in Pakistan for the manufacture of dichromates and chromium paints. The lack of cheap electric power is the main hinderance in the way of domestic utilization of our chromite production. We could manufacture ferrochrome and chromium paints in addition to increasing the production of dichromates. Also, manufacture of chrome-magnesite refractory bricks could be undertaken, eliminating the imports of this item.

Known reserves of good quality barite in Pakistan are of the order of 4—5 million tons and yet finely ground barite is being imported. This again illustrates the need for coordination in planning production and utilization of minerals.

Volcanic Rocks

Volcanic rocks offer an example of how apparently useless rocks can be converted into valuable products. They also illustrate how research can lead to developments vital to a country's economy. Even now most of us consider volcanic rocks to be of little use except as road metal or ballast. In many of the European countries now high temperature pipes are being manufactured out of volcanic rocks. These are being extensively used in metallurgical processes and have the advantage of being free from undesirable metallic impurities. We have very large reserves of these rocks and could undertake manufacture of these pipes which will have an excellent export potential in addition to being of use at home. Rock wool manufactured from these rocks is used for insulation purposes in buildings and also as light weight cement aggregates.

Many other minerals like vermiculite, celestite, bauxite. ochres, clays, mica etc., have not been mentioned here partly because detailed investigation of these minerals have not been completed and partly because I do not wish to make this address unnecessarily lengthy.

Some Suggestions

In the foregoing pages I have only briefly mentioned how mineral resources are being utilized in other countries of the world. These countries have acquired their high degree of industrialization and prosperity solely through this utilization of their mineral resources, other developments have followed. If we are to achieve lasting progress and prosperity I feel the following steps are a must.

Mineral Resources Evaluation

Detailed mineral resources position papers must be prepared before the Fourth Five Year Plan is drawn up. These papers should give detailed information about each mineral that is known to occur in the country. Location, physical and chemical properties, estimated reserves and favourable areas for further exploration should be indicated. This cannot however, be achieved unless the G.S.P. is substantially and quickly expanded.

Utilization

The need for research on the utilization of mineral resources cannot be over emphasized. There is, no doubt a general appreciation by the Government of this need and steps are being taken to initiate such a work but utilization research is a part of evaluation programme and should not be located far from the G. S. P. I would therefore very strongly suggest that the proposed mineral dressing wing of the P.C.S.I.R. should be set up at Quetta and not at Peshawar. They should be as close to the evaluation agency—the G.S.P., as possible. This will enable the scientists of the two organizations to exchange views and collaborate in their research work. As a matter of fact there is a great need for the establishment of a mineral utilization research organization like the U. S Bureau of Mines. The primary responsibility of this department will not only be utilization research but also determination of mineral consumption trends and demands in the years to come. The Bureau, in collaboration with G.S.P., will guide the Government's policies and indicate the sources from where our mineral requirements can be met.

Research Cell

There seems to be insufficient appreciation in the country of the need for fundamental research in earth science. The fact that fundamental research of today is the economic research of tomorrow can be emphasized again and again. Unless we undertake fundamental research in our geological problems we are not likely to derive full benefit from our natural resources.

Mineral Testing Facilities

There are no reliable mineral testing laboratories in the country. This is a great barrier in the way of mineral explanation and exploitation. Immediate steps must be taken to establish such laboratories in some of the existing departments like G.S.P., P.C.S.I.R., Central Testing Laboratory etc. Also, private mining companies should be encouraged to set up mineral testing laboratories of their own.

Earth Science Education

Geology is taught in five universities in the two wings of the country. Unfortunately the courses prescribed and the lack of field training do not prepare the

students for full fledged geological work. I think it will not be unfair to say that most fresh M.Scs. do not even know the full scope of geology and its application in the modern world. There is thus great need for revision of curricula and greater emphasis on field training during the vacations. The universities are not entirely to blame for this state of affairs since most of them suffer from acute shortage of funds, lack of library and laboratory facilities and shortage of staff. A greater interest by the Government in the teaching and application of this subject is strongly urged.

Mining is being taught in the West Pakistan University of Engineering and Technology and this department will be shifted to Pakistan College of Mineral Technology at Quetta. The College will also impart education in geological engineering (perhaps applied geology is meant by this term), oil and gas technology and ultimately metallurgy. Here again it must be emphasized that unless proper stress is laid on practical training, the fresh graduates will not be of much use to the industry. While on the subject of education it would be appropriate to say that greater emphasis should be laid on exchange visits of the earth scientists to various countries of the world. In view of the lack of highly qualified men in this field a greater number of mining engineers, geologists, oil and gas technologists should be chosen for foreign scholarships and practical training programmes. Participation in the International Professional Meetings should be made obligatory for the scientists in their respective fields.

It would be appropriate to mention that geology and mining graduates do not find jobs easily. This again illustrates the need for a clear Government policy on the role of earth scientist in the national development programmes. Unless immediate and concrete steps are taken in this direction our mineral resources will be damaged beyond repair.

Mining Leases

Most of our mineral deposits are being destroyed by haphazard working and short term profit motives of the miners with no financial resources. It appears that instead of encouraging the formation of large mining companies with financial and technical resources encouragement is given to the small operators resulting in division and subdivision of mineral properties. This clearly is not in the best interests of the country. Mining leases should be granted to only those parties who have financial resources and—have demonstrated their ability to run mining industry on proper lines. It would be very unfortunate if mining leases are granted for considerations other than merit alone.

Also, there is great need for enforcing some rules about the employment of technical persons in the mining industry. It is suggested that any company produ-

cing more than 12,000 tons of coal in a year should have a qualified mining engineer and any company producing more than 24,000 tons of coal in a year should also employ a geologist in addition to two mining engineers. In metalliferous mines also the same limits can be applied. In non-metalliferous mines—like limestone, marble gravel, etc.,—the employment of mining engineers and geologist should be made compulsory. Unless this is done our mineral resources will be destroyed.

Development of Mining Industry

If mining industry is to be developed on scientific lines (and without this we can not even survive) special steps should be taken by the Government to encourage investment in this high-risk industry. It is recommended that :

a) In view of the long time it takes to develop a mineral deposit, the mining companies should be permitted to carry forward their losses for a period of fifteen years from the date of commencement of mining operations.

b) Cash licences for importing mining machinery like generating sets, compressors, drills, bulldozers, road building equipment, mineral processing machinery, pumps etc., should be given to the industry. The licences should be related to the size of the mining operations of the licensee.

c) In addition, special licences should be given to those mining industries that export minerals. These licences should be related to the foreign exchange earned by the mineral exporter.

d) Foreign exchange should be allocated to enable mineral producers to go abroad for market exploration and study tours.

Availability of power

Since minerals form the basic "raw material" for many of the industries it is essential that mineral production costs be reduced to a minimum. This cannot, however, be achieved unless cheap electric power is made available to the mining industry. This will enable the industry to not only reduce the cost of production but also produce mineral salts, chemicals, alloys and refined metals for which there is a great demand in the country.

Railway Freight

In the last ten years railway freight on some of the minerals like coal, has more than doubled. Because of the vital role the minerals play in the national development, special reduced freights should be applied to all minerals and rocks. This will stimulate development of mineral based industries in the country. Also, some of our minerals like gypsum and halite can be exported if the existing railway freights are reduced.

Cottage Industry

Many of our mineral deposits are rather small in size and as such considered to be uneconomic. This is because we measure our deposits with the standards of those countries which have very large mineral reserves. Some of our mineral deposits (like the iron ore deposits of Chagai District) can be exploited on Cottage Industry basis. This will result in the development of many small industries in various towns and provide job opportunities and technical training centres for the rural population of the country.

Mineral Marketing

Since mineral production targets are fixed by the Government without any regard for the sales prospects the Government should guarantee that it will buy whatever the miners are unable to sell. Some minerals, like coal need quick disposal while other like metalliferous minerals can be stocked for long periods without deterioration in their quality. If the Government cannot purchase these minerals, interest free loan should be advanced to the miners against the mineral stocks so that production can continue. It is again emphasized here that any wastage of minerals or mineral deposits is a national loss and must be avoided at all costs.

Decision has recently been taken by the Government on the dismemberment of the One Unit in West Pakistan. It would be disastrous if mineral leasing is transferred to each of the small provinces. I strongly feel that minerals should be made a central subject. This will also speed up the development of East Pakistan coal-fields.

And last but not the least, is the great need to educate the public on the role of earth sciences in the national economy. I sincerely feel that for our very survival it is essential that the fourth five year plan be oriented to the development of mineral resources. Minerals deserve at least the same importance as given to agriculture, whose very existence is dependent upon minerals.

DEMOGRAPHIC AND ECOLOGICAL TRENDS OF KARACHI[1]: THE EXAMPLE OF AN INDUSTRIALISING CITY

ZAFAR AHMAD KHAN

KARACHI is the most rapidly industrialising city of Pakistan. In 1947, the year of independence, it had industrial plant equal to one-seventh in the value of either province (East and West Pakistan) and its industrial establishments formed only a small percentage (2.9 percent) of the total industries of Pakistan.[2] By 1959, the capital invested in Karachi equalled the value of that invested in the whole of East Pakistan. It represented also three-fourth of the amount spent in West Pakistan.[3] The number of industrial plants in Karachi increased from forty-one in 1947 to 907 in 1959 and over 3,000 by 1969. Available data show that during the last two decades the number of factory workers in Karachi increased at an average rate of fifty-five percent per annum. Today, Karachi possesses twenty-six percent of the industrial units and twenty-two percent of industrial workers of the whole of Pakistan. Its industrial products and by-products constitute a value of about twenty-eight percent of the entire industrial production of the country.

The industrial development in Karachi gave a great boost to its population growth. A far greater number of persons migrated to this city than into any other urban centre in West Pakistan. The population rose from 387,000 in 1941 to 1,068,000 in 1951, an increase of 161 percent. For comparison, the growth during the same decade in Lahore was from 672,000 to 849,000 (twenty-six percent), in Hyderabad from 135,000 to 242,000 (eighty percent), in Lyallpur from 70,000 to 179,000 (155 percent) and in Multan from 143,000 to 180,000 (twenty-seven percent), the second, third, fourth and fifth largest cities of West Pakistan, respectively. By 1961, the population of Karachi became 1,913,000 (eighty percent increase) and that of Lahore only 1,296,000 (fifty-two percent), Hyderabad 435,000 (seventy-nine percent), Lyallpur 423,000 (137 percent), and Multan 358,000 (ninety-eight percent).

The large number of industrial concerns, labour force and new-comers emphasize the predominance of Karachi in the developing economy and the industrial life

[1]This is a Chapter of the author's Ph. D. Thesis: Karachi, a Pre-industrial city in Transition, University of London, 1968.

[2]A.M. Ghaus, *Economy of Pakistan : A Review* (Karachi, 1961), p. 9.

[3]*Ibid.*

Dr. Khan is Professor of Geography, Government College (Post-Graduate Section), Rawalpindi.

of Pakistan. An analysis of some of the characteristics of the people of Karachi thus reveals the extent to which the forces of urbanism associated with the introduction of industry have led to the modification of the pre-industrial society. It highlights a wide range of physical and cultural conditions prevailing in the city and the sociological problems arising therefrom. It also points to the trends of population redistribution and ecological patterning.

Origin and Re-distribution of Population

Of the total population of Karachi, about sixty-six percent comprises of immigrants,[4] eighteen percent inmigrants[5], and only sixteen percent natives.[6] Their distribution in the city is by no means random. Some sectors are inhabited predominantly by immigrants, some by inmigrants and others by natives.

The map of such a distribution which is examined here is based on enumeration districts of a survey conducted in 1959 (and revised in 1961) by the Central Statistical Office, Karachi.[7] The city was divided for this purpose into 162 enumeration districts

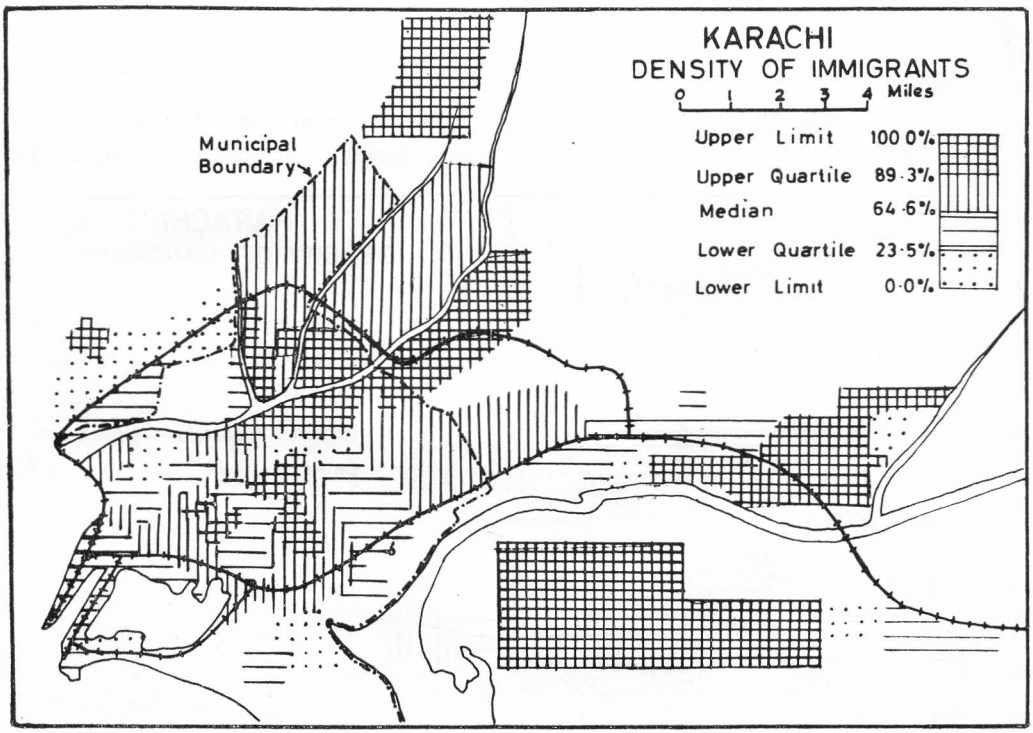

FIGURE 1

[4]Immigrants : migrants from other countries. Most of the immigrants in Karachi are from India.

[5]Inmigrants : migrants from various parts of Pakistan, excluding Karachi.

[6]Natives : persons born in Karachi.

[7]*Sample Survey of Karachi Population, 1959*, Central Statistical Office, Government of Pakistan, Ministry of Finance, (Karachi 1959).

called *chunks*. These *chunks* were small enough to be easily managed by single enumerators. After the numbers of the immigrants, inmigrants and natives were obtained in each of the *chunk*, they were arrayed in three different groups and their median and two quartiles established. These gave four categories which have been mapped.

Spatial distribution of population.

A high percentage of immigrant population is a marked feature of residential Karachi (Fig 1). The areas on the urban fringe are predominantly immigrant. Here are found refugee colonies, and re-settlement colonies, which have been developed to provide alternative accommodation for poor refugee families, living in the city proper since 1947 in huts, religious buildings, schools and clubs. Another predominantly immigrant area extends from just north of the city centre eastward along the River Lyari. The third predominantly immigrant area is on the eastern fringe of the city centre. These two areas in the second zone of the city have been developed in recent years by private companies, housing societies and the government to provide housing accommodation to homeless immigrants and to the government employees. Very high densities of immigrants are also found in some parts of the city centre, which contain large tenements and have thus attracted immigrants especially single males.

The distribution of inmigrants is very different from that of the immigrants (Fig 2). Very high densities occur in three areas, located on the urban fringe. Two

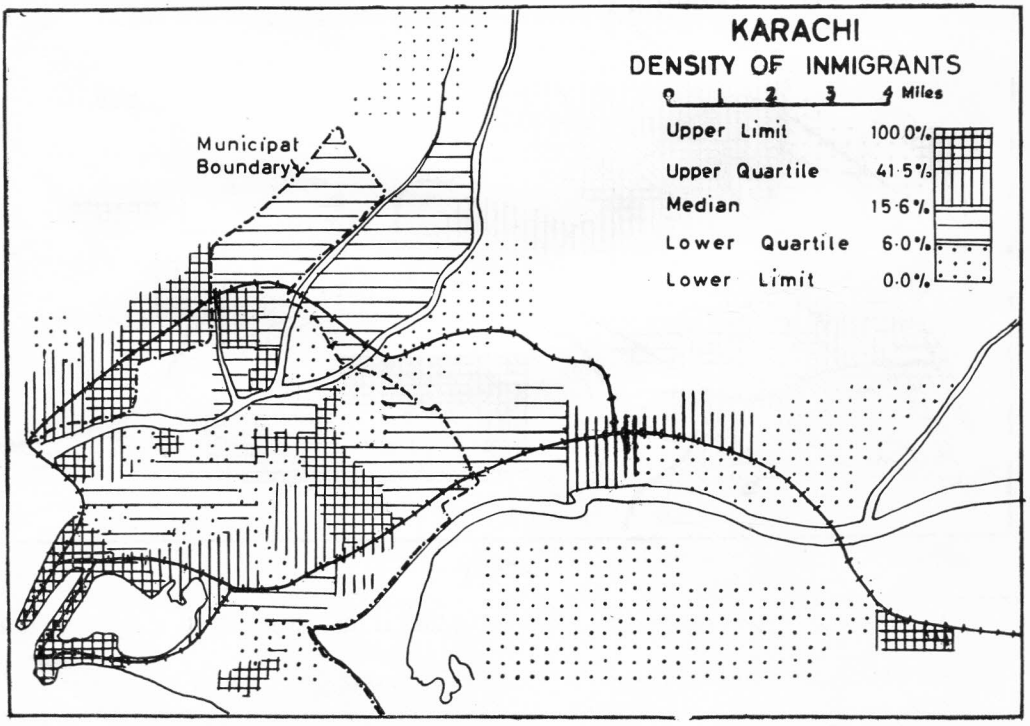

FIGURE 2

of these are industrial. One is in the north-west of the city and corresponds with the Sind Industrial Estate and the surrounding region. The second is situated in the east of the city. Its nucleus is formed by the Landhi Industrial Estate. The third area is located in the west and corresponds with the Karachi docks and the West Wharf industrial region. In all these areas inhabitants have been brought in to work in the newly developed factories and docks.

The distribution of natives contrasts sharply with that of immigrants and inmigrants. They are confined to the old sections of the city (Fig. 3). The most important region is in the integumental zone on the north of the city centre. This is the oldest industrial region of the city and is today mixed up with housing containing hovels and huts. Other areas are found scattered in the second and third zone. They represent the old isolated settlements, which have been engulfed in recent years by urban extensions.

Age and Sex Structure

There are two remarkable features about the age and sex composition of Karachi. First in all age groups there are more males than females. Secondly, the

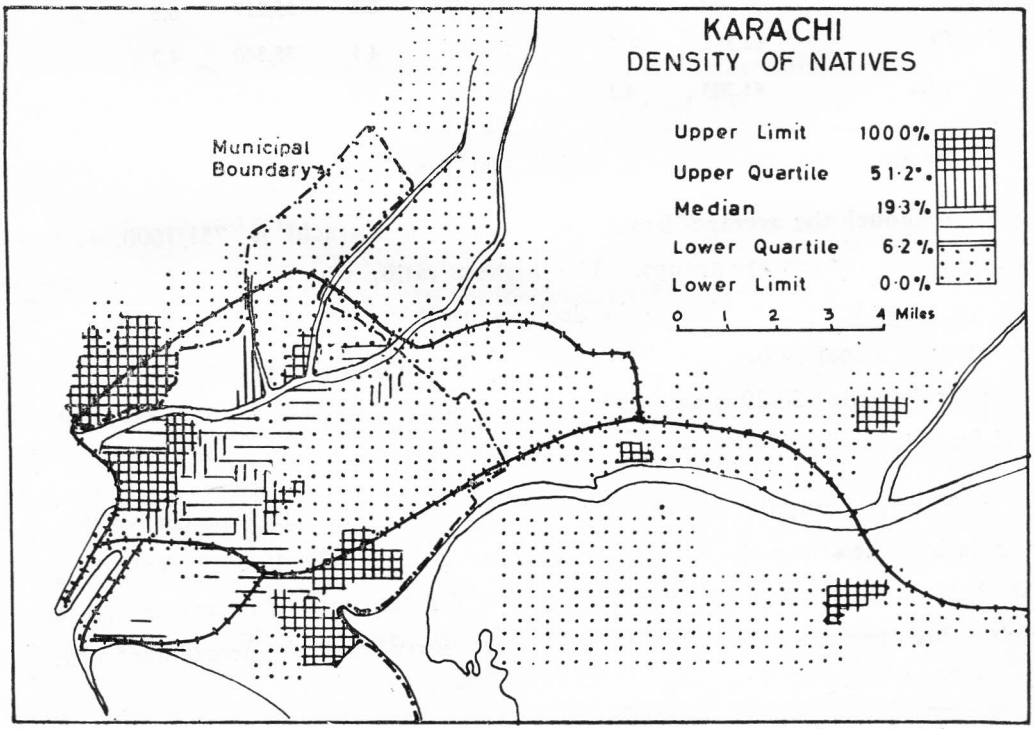

Figure 3

population is dominated by the 20—30 years age group (Table 1). These features contrast sharply with those found in western cities. In Belfast, for example, the female/male ratio is as high as 1,170/1,000 and there are high percentages of females in all age groups upto twenty-five.[8] This shows the difference between a western city which has completed the phase of industrialization long ago and a pre-industrial city passing through the early stages of industrialization.

TABLE 1—KARACHI : AGE AND SEX COMPOSITION OF POPULATION, 1961

Age groups in years	Both sexes	Percentage	Number of Males	Percentage	Number of Females	Percentage	Sex Ratio Females per 100 Males
All ages	1,912,598	100	1,087,583	100	825,015		
0—9	579,665	29.9	295,996	27.1	273,671	33.1	923
10—19	697,329	20.5	216,243	20.2	180,206	21.6	830
20—29	377,693	19.6	228,364	20.4	149,334	17.8	695
30—39	251,879	13.2	156,972	14.4	94,907	11.9	611
40—49	148,279	7.8	93,062	8.8	55,217	6.8	600
50—59	82,583	4.7	51,743	4.1	35,840	4.3	690
60—over	45,203	4.3	45,203	4.0	35,847	4.3	780

SOURCE : District Census Report, Karachi, 1961, Table 7, pp. 4—8.

Although the average females/males ratio in Karachi is 751/1000, it differs widely in the various age groups. The highest ratio, which is 923/1000, is found in the age group 0-9 years. The ratio declines to 830/1000 in the group 10-19. But the greatest disparity between the sexes is found in the groups above twenty. The ratio for the group 20-29 is 695/1000, for the 30-39, 611/1000, for the 40-49, 600/1000 and for 50-59, 690/1000.

The age group 0-9 (males and females) accounts for 29.9 percent of the total population, the group 10-19, 20.5 percent, the group 0-29, 19.6 percent, the group 30-39, 13.2 percent and the remaining groups 16.8 per cent. This means that about eighty-three percent of the population is under forty years, the percentage in the age group 20-39 being 32.8 percent.

[8]E.A. Jones, *Social Geography of Belfast*, (London, 1960), p. 146.

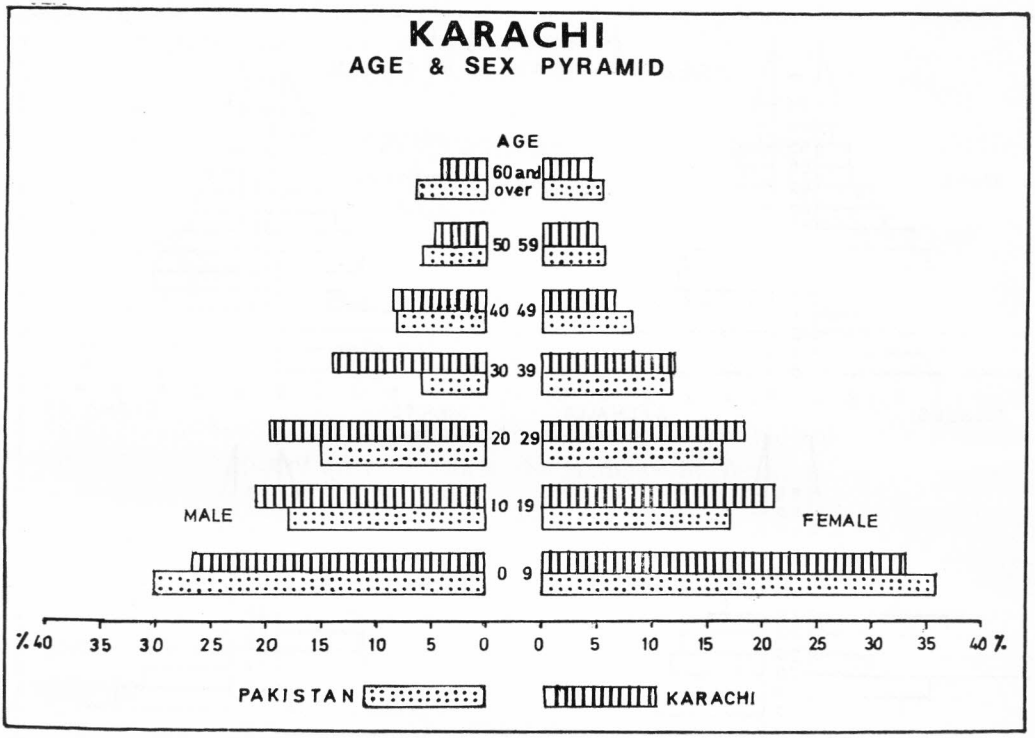

FIGURE 4

The proportion of young people in Karachi is further illustrated by a comparison of the age/sex pyramid of the city with that of Pakistan (Fig. 4). The age group 0-9 in Karachi has lower percentages of males and females than that of Pakistan. But the age groups 10-19, 20-29 and 30-39 in the city have higher percentages of males and females than the corresponding groups in the country. Above thirty-nine there is no appreciable bulge in the pyramid of Karachi. On the contrary, a conspicuous bulge appears on the female side in the pyramid of Pakistan. In the next group, 50-59, the bulge becomes prominent on the female side as well as on the male side and it is maintained in the next higher group, 60-69.

This high proportion of young people, especially in the age group 20-39, indicates clearly that a very large number of young persons have immigrated into the city in recent years. This is to be expected in a city like Karachi, where employment opportunities are being created at a fast rate on account of industrial development.

AGE AND SEX COMPOSITION BY ORIGIN OF POPULATION

However, this general feature of the age/sex distribution varies considerably among the natives, inmigrants and immigrants. This reflects significant sociological differences among the various groups of inhabitants and therefore needs a brief examination.

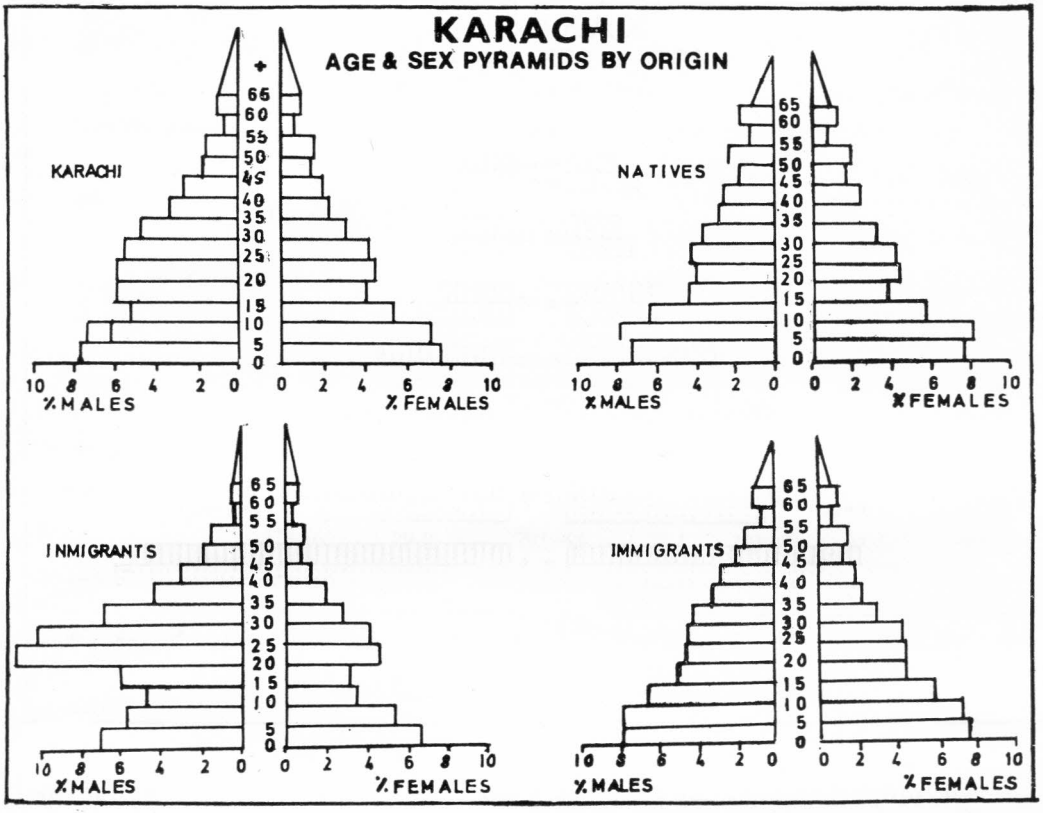

FIGURE 5

The age and sex pyramid for natives is slightly distorted (Fig. 5). It has a narrow base at the age group 0-4. Like the pyramid for the total population, it also shows a slight bulge at the age groups 20-24 and 25-29. But it is only on the female side. In fact, the percentage of males in the age group 20-24 is less than the percentages of males in the groups 15-19 and 25-29, which are almost of equal size. Between the ages 30-49, all the groups show a regular decrease. There is, however, a prominent bulge in the age group 50-55.

The age and sex pyramid of the inmigrant population is greatly distorted. The bars on the males side show greater length in all age groups. They are extraordinarily prominent in groups 20-24, 25-29 and 30-34. On the female side prominent bars are found in groups 20-24 and 25-29. In fact about one-third of the inmigrant population is concentrated in the age groups between twenty and thirty-five years. Over thirty-five years of age, the pyramids show a gradual decrease (on the males side as well as the females side) in all age groups.

Unlike the irregular pyramids for natives and inmigrants the age and sex pyramid for immigrants is quite symmetrical. It conforms to a typical pattern,

with a broad base and gradually tapering bars in all successive groups. This shows that the immigrants moved into the city as a balanced population in terms of age and sex and that they are a settled group of population now.

Like age/sex pyramids the sex-ratio of various migrant groups also shows a great variation from one another. There are 857 females per thousand males in the total population. But the number of females per thousand males among natives is 960, among immigrants 814 and among inmigrants 534.

Age and Sex Variations in City Sectors

The age and sex structure differs from area to area within the city owing to the intermingling of natives, inmigrants and immigrants in varying proportions (Fig. 6) Sex-ratios obtained from various *chunks* when plotted on a map showed four different types of areas in which the number of females per thousand males ranged as follows : 550 to 649; 650 to 749; 750 to 849; 850 to 949. Then the age/sex pyramids were prepared for eight *chunks*, which were selected from the above type of four areas. Pyramids A and Al represented the area with sex-ratio 850 to 949/1000, pyramids B and Bl the area with sex-ratio 750 to 849/1000, pyramids C and Cl the area with sex-ratio 650 to 749/1000 and the pyramids D and Dl the area with sex-ratio 550 to 649/1000.

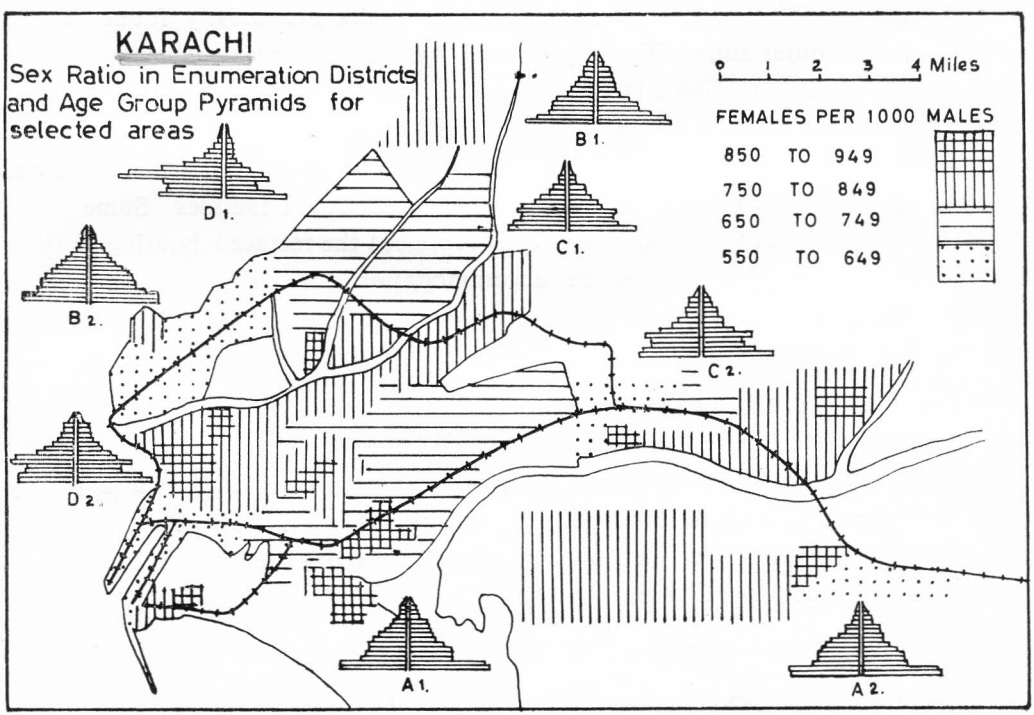

FIGURE 6

There is a close correlation between the areas of various sex-ratios and their respective age/sex pyramids. The pyramids for the sex-ratio 850-949/1000 area (A and Al) are slightly distorted and resemble to a great extent the pyramids of natives, discussed earlier. The pyramids for the sex-ratio 750-849/1000 area (B and Bl) are symmetrical and show features similar to those of the immigrants' pyramid. The pyramids for the sex-ratio 550-649/1000 area (D and Dl) are greatly distorted. A prominent feature is the great bulge on the male side in the age groups between twenty and thirty-five years. These pyramids show the characteristic features which have been seen in the pyramids for immigrants. The pyramids for the sex-ratio 650-749/1000 area are asymmetrical and do not resemble the pyramids of any other original groups. This means they represent a population which is a mixture of all three groups.

The areas of the highest sex-ratio (850-949 females per 1000 males) although scattered are found mainly on the margins of the city centre. The one in the north represents the older parts of the Lyari Quarter which is built of huts and hovels and houses the poorer classes of inhabitants. Another prominent area is in the south in the integumental zone. It is the bungalow district, which was developed by the rich citizens in the inter-war years. Other areas are found in outer zone in east and west. They are old villages, which have been engulfed in recent years by the urban extensions.

The areas with 750-849 females per thousands males are mostly found in the city centre and in outer zone. The city centre is built up of large tenements, locally called *chawls*. They attracted a large number of immigrants, especially unmarried males. Some areas with the sex-ratio 750-849/1000 on the north and east of the city centre. Here they coincide with the *quarters*[9] and the terraced housing districts, developed by the Government for their employees and refugee families. Some areas are also found on the urban periphery. They represent the terraced housing districts which have been developed to provide accommodation for the poorer classes of refugees. Some of them have been created as re-settlement townships for refugee families, which have been moved out of shanty dwellings in the city proper.

The areas with 650-749 females per thousand males are found in the middle zone. They represent the *kothi*[10] districts which have been developed by Housing Societies and the Karachi Development Authority. Plots were allotted on a lottery system so that persons with different origin were able to obtain land. People coming from other countries were attracted to these areas on account of the cosmopolitan atmosphere which developed here.

---

[9]A quarter is a small single storey house, containing two to three rooms and built by the Government.

[10]*Kothi* is the local name of a house, which combines the characteristics of a bungalow and a tybical Muslim house.

The areas with the lowest sex-ratio (550-649 females per 1000 males) are found on the urban periphery in association; the Karachi docks and the industrial estates, the Sind Industrial Trading Estate, the Landhi Industrial Trading Estate and the West Wharf Industrial Area. Another prominent area is situated along the railway line in Drigh Road. This is a district of barracks and bungalows which house army personnel.

Family Composition

There are three different types of family group : 1) The nuclear family, where husband and wife live with their unmarried children. 2) The extended family, where one or more relatives live with a nuclear family ; and 3) The joint family, where two or more nuclear families live together (Table 2).

Table 2—Karachi : Family Classification by Migrant Status, 1959.

Migrant Status	*Nuclear*		*Extended*		*Joint*		*Non-family type*	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
All Status ...	1,031,800	100	313,250	100	272,100	100	136,025	100
Natives ...	182,450	17	46,375	15	63,975	24	7,325	5
Inmigrants ...	152,375	14	56,900	18	33,825	12	73,300	54
Immigrants ...	764,250	69	209,975	67	174,300	64	43,575	32
No information ...	...	...	...	...	...	...	11,825	9

Source : *People of Karachi*, Pakistan Institute of Development Economics (Karachi, 1964), Table 6.02.

The most common type of family is the nuclear one. Nearly sixty percent of the population belong to a family of this type. It is more common among natives and immigrants than among imnigrants. This may be accounted for by the fact that many inmigrants are unmarried or have left their relatives behind them and are living in the city all alone. It is estimated that there are in the city over 73,000 (twenty-three percent of the total) single male inmigrants who do not belong to a family.

The extended and joint family systems which are so traditional in the Indo-Pak subcontinent, are not popular in Karachi. The proportion of extended families in the total number of families is seventeen percent and that of joint families fifteen percent. These low percentage are primarily the result of financial difficulties and lack of accommodation. But on the other hand no one can deny that social values have greatly changed and the present generation desires a break from the pre-industrial traditions and prefers independent living.

Occupations and Socio-economic Ranking

The industry in Karachi has been divided into four broad groups : 1) Manufacturing and Trade; 2) Services and Professions; 3) Transport; and 4) Agriculture (Table 3). It shows that the twin bases of prosperity of the city are manufacturing and trade. They employ 45.2 percent of the total labour force. Services and professions absorb the second largest proportion (44.5 percent) and transport the third (7.0 percent). Persons engaged in agriculture are very few (only three percent).

TABLE 3 – KARACHI : DISTRIBUTION OF THE WORKING LABOUR FORCE BY THE TYPE OF INDUSTRY.

Industry	Number	Percentage
All industries	554,140	100.0
Manufacturing and Trade	250,450	45.2
Services and Miscellaneous	246,440	44.5
Transport	39,050	7.0
Agriculture	18,200	3.3

SOURCE : *People of Karachi*, The Pakistan Institute of Development Economics, (Karachi, 1964), Table 3.81.

Another classification, which is based on occupations shows that 3.3 percent of the population is unemployed and 17.5 percent is employed in unclassified minor jobs (Table 4). 19.9 percent falls into the unskilled and semi-skilled group, 16.1 percent into the 'skilled labour' group and 12.2 percent into the 'servant and related' group. This means that the only remaining 30.7 percent is employed in better jobs. The largest proportion of these (8.6 percent) falls into the 'administrations and managers' group. This is followed by the 'sales workers' (7.4 percent), 'drivers, postmen and related' (5.9 percent), farmers and fishermen (3 1 percent), clerical workers (3.2 percent) and professionals and technicians (2.6 percent).

TABLE 4—KARACHI : DISTRIBUTION OF WORKING LABOUR FORCE BY OCCUPATIONS.

Occupation	Number	Percentage
All occupations	554,750	100.0
Professional and Technicians	14,775	2.6
Administrators and Managers	49,300	8.6
Clerical Workers	17,575	3.2
Sales Workers	42,600	7.4
Farmers and Fishermen	18,500	3.1
Drivers, Postmen and related	33,700	5.9
Skilled Labourers	92,175	16.1
Semi-skilled and unskilled labourers	114,150	19.9
Servants and related	71,775	12.2
Workers not classified	100,200	17.5

SOURCE : *People of Karachi*, Pakistan Institute of Development Economics (Karachi, 1964), Table 3.50.

All occupations are not of equal importance in the society. In order that the duties which go with them should be performed with the diligence that their importance require, the society offers different rewards for different positions.[11] This applies first of all in the field of monetary remuneration. Thus a stratification of occupations according to the earning capacities of the people engaged in them shows to a great extent the socio-economic ranking of the workers.

This is certainly true in the case of Karachi. Table 6 shows that the greater the importance of the job, the greater is its financial reward. It also

[11] K. Davis : *Human Society* (New York : 1961), p. 367.

shows that a number of different occupations attract similar monthly wages. This provides a basis on which to combine them into three broad groups (Table 5). The high income groups 1 and 2 together include all the 'white-collar workers'. The middle income groups 3, 4, 5 and 6 are the skilled workers. The low income groups 7, 8 and 9 include semi-skilled and unskilled workers. The distribution of the three classes in the total population was as follows :

TABLE 5—INCOME GROUPS BY SEX

Group	I	II	III	Total
Male	59,950	201,325	27,215	533,425
Female	4,125	3,225	1,397	21,325
Total	64,075	204,550	28,612	554,750
Percentage	11.7	36.2	50.1	100

TABLE 6—KARACHI : OCCUPATIONS AND THEIR MEDIAN MONTHLY EARNINGS

Occupational Groups	Median Monthly Wages
I. Professionals and Technicians	Rs. 380
Administrators and Managers	Rs. 370
II. Skilled labourers	Rs. 158
Clerical Workers	Rs. 105
Driver	Rs. 103
Sales Workers	Rs. 100
III. Semi-skilled and unskilled	Rs. 74
Farmers and Fishermen	Rs. 72
Servants and related	Rs. 67

SOURCE : The Table is based on a survey conducted by the author in 1964. The figures are therefore approximate.

In order to obtain an index of socio-economic status the numbers of persons in the three classes were weighted in each *chunk*. Group I was weighted four times and group II twice, but group III was left unchanged. The figures thus obtained were added together to produce an index for each *chunk*. These indices were then arrayed and the median quartiles established. The upper quartile to the upper limit represented First Rank, median to upper quartile Second Rank, lower quartile to median Third Rank and lower limit to lower quartile Fourth Rank (Fig. 7).

The map of socio-economic ranking shows clearly that the inhabitants of Karachi are sharply segregated on the basis of cultural background and that different areas of the city are inhabited by certain migrant groups.

The first rank areas are found in a number of areas adjacent to the city centre. This empasises the validity of general theory that in a pre-industrial city the elite live close to the city centre. The two axes of the first rank projecting from the city centre

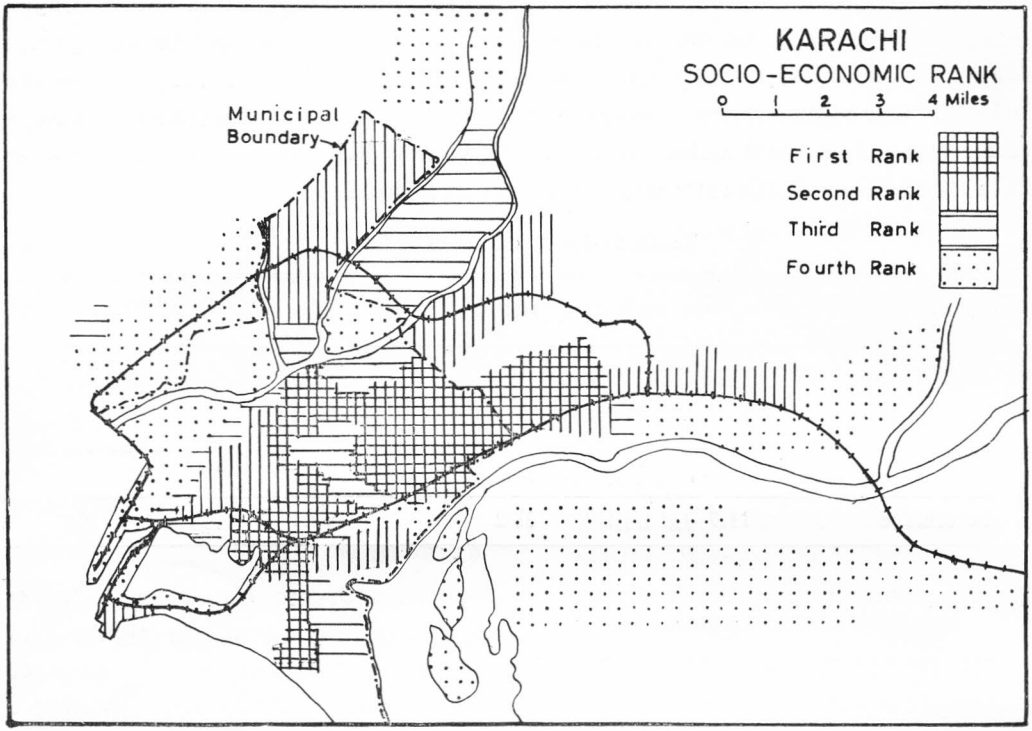

FIGURE 7

to the south and the east are the result of the recent out-migration of richer people from the central parts of the city. As a consequence, however, the city centre has become degraded into a second rank district. Other second rank areas are scattered in the middle zone of the city and so are also the third rank districts. But the fourth rank areas are best developed in the outer zone, especially on the urban fringe.

The areas marked on the map of the socio-economic rank can be corelated with the various types of residential districts. The bungalow district, the villa district and the kothi districts are of the first socio-economic rank, the chawls region and a part of the kothi district developed by the Government in the early years of partition represent the second rank enumeration districts. The quarters area, barracks district, the kothi district of small housing societies are of the third rank. The huts and hovels district and the terraced housing areas belong to the fourth rank (Fig. 8).

CONCLUSIONS

Following inferences can be drawn from the foregoing :

1) Contrary to the western city centre, which are normally devoid of population, the central business district of Karachi is an important residential area with very high population densities. Socially the area is of second rank and the population consists of mostly new-comers.

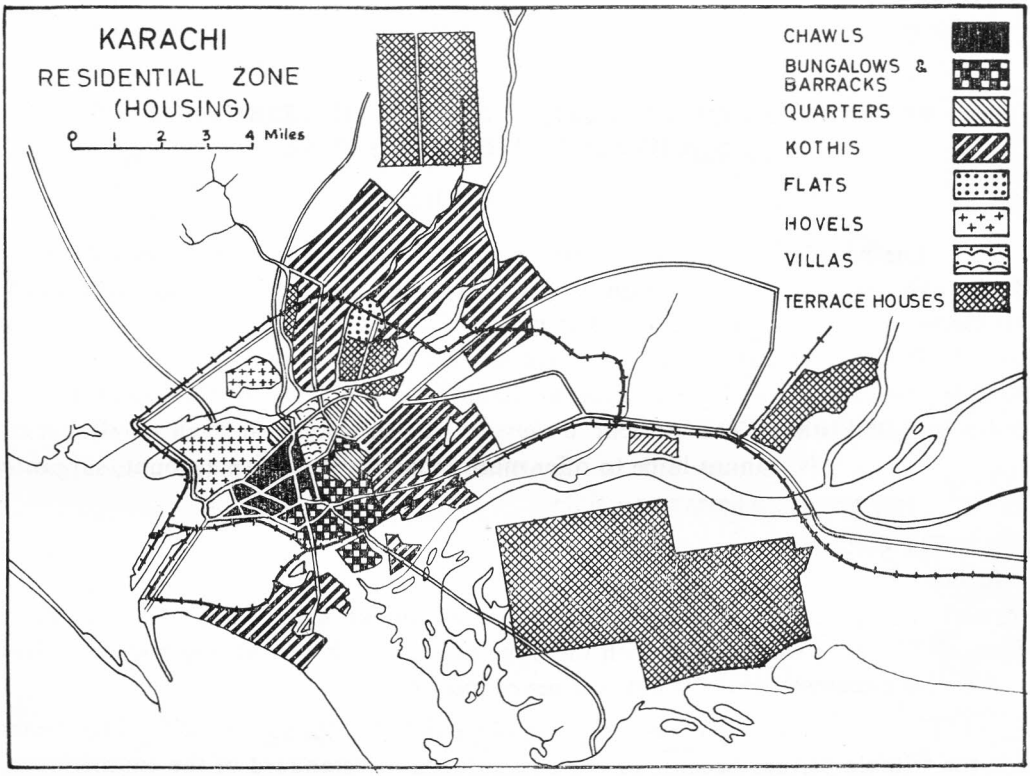

FIGURE 8

2) Around the central business districts there are regions which differ from one another both in land-use and socio-economic ranking. An area in the north (the Lyari Area) contains both industrial premises and industrial workers' houses and since it is region of decay it might well be equivalent of the 'zone of transition' of western cities as envisaged by Burgess. But on the other hand there are three areas in the zone contrasting with what would be expected according to Burgess's theory, for they are comprised of upper and upper middle income groups. In the north-east is the villa district and in the east and south the bungalow districts. Although these areas are old, yet they are in a fine condition and possess all the requirements of elegant living. As the map of the density of natives indicates, most of the areas have a high percentage of native born population.

3) Outside the second zone lie the main residential regions of Karachi. Some of them rank third, some second, and some first on the socio-economic map of the city. The second and third rank areas are in the north and east and the first rank areas in the east. The first rank areas extend from the high class areas of the bungalow district lying in zone two. The inhabitants of the second rank areas are mostly new-comers. But a substatial percentage of the population of the first rank areas consists of the old inhabitants who have recently moved into the districts from the inner zone.

4) Zone three merges, in several directions, with commuter townships Whereas Burgess envisages the outer zone of western cities as one containing decent suburbs housing a native born population, in Karachi the areas are nothing more than shanty townships and the inhabitants are recent inmigrants and immigrants.

POPULATION OF CHITRAL : GROWTH, DISTRIBUTION AND SOCIO-ECONOMIC STRUCTURE

ISRAR-UD-DIN

"The population of any country is more than just a number of people ; it is a distinctive group, a society, with its own structure, its own way of life, its own problems of waste and efficiency, and its peculiar burden of very young and very old".[1] But, unfortunately, lack of materials for a desired period, inaccuracies, incompleteness and errors in the data available are problems of the geographers in India and Pakistan. The present discussion being based on such unreliable and incomplete records, cannot hope to offer more than a descriptive account, supported by the scanty records wherever possible.

The first official census of Chitral was that of 1941, under British rule. The information, however, was left unsorted with the excuse of war and economy, rightly termed "...the falsest of false economy—an economy of knowledge...." by Professor Spate.[2] The data was shelved with the hope of "...possible recording and tabulation in happier circumstances..."[3] but was never touched again.

The second incomplete census took place in 1951. Its published findings present a more reliable picture because of the better education standard of the enumerators.

The third census taken in 1951 was ambitiously conceived but unfortunately, in spite of spending a great deal of time, money and labour, the result is far from satisfactory. There is no doubt that this time the data is more complete and includes more items, such as (1) Geography, History and Administration ; (2) People and Environment ; and (3) Important Places. But too much of the information, however, is either culled from old gazetteers or is the product of some incompetent hand. For the first time, an attempt was made to list villages and their population separately. Had the Census of Pakistan Department devoted a little of its time to ensuring the accuracy of the data it was investigating, and also to such small essentials as the correct listing of the names of settlements, then the census would have been infinitely more valuable. However, not only was much energy dissipated on rehashing out-dated inaccuracies, but as many as a third of the village names are unintelligible except for those with personal knowledge.[4]

---

[1] F. Jones, *Human Geography* (London, 1964), p. 38.

[2] O.H.K. Spate, *India and Pakistan* (London, 1954), p. 97

[3] I.D. Scott, *Preface Note to the Census of India, 1941*, Vol. 10. N.W.F.P.

[4] To give a few examples ; the villages Ayun, Gahrat, Jinjirat, Kauti, Orghoch, etc. are written as : Awan, Ligreet, Jangrat, Kooti and Maroor Ghuch, respectively.

Mr. Israr-ud-Din is lecturer, Department of Geography, University of Peshawar.

Apart from the above censuses, there exists a record which purports to give the population total, with regional detail, for the year 1899-1900.

Growth of Population

The population of Chitral within this century, according to the above information, has grown as follows :

Table 1—Growth of Population

Year	Population	Variation	Percent Variation
1900	48,730 (*a*)		
1941	107,906 (*b*)	59,176	+122%
1951	105,724 (*c*)	—2,182	—2%
1961	113,057 (*d*)	7,333	+7%

(*a*) Frontier and Overseas Expeditions from India, Vol. I, North of the Kabul river (A Government publication) London, 1907, p. 80.

(*b*) Census of Pakistan 1951, Vol. 4 ; p. FR-2-1.

(*c*) *Ibid*, p. 1-4.

(*d*) Population Census of Pakistan, 1961, Census Report of Tribal Agencies.

The first two figures are wildly inaccurate. There is no evidence to support a population leap of 122 percent or thirty percent per decade, during the first forty years of the century. In conditions of ill nourishment, the absence of medical facilities, and the influenza epidemic of 1918-19, the death rate was undoubtedly high. Hence the 1900 estimate probably falls short by as much as sixty-nine percent of the true figure.

Apart from such extrapolation, there are other reasons for considering the figures as inaccurate. Such censuses were made only for purposes of taxation, military service or forced labour. In such circumstances the enumerators could hardly be expected to be enthusiastic about their jobs and so seem in filling in the spaces to have been swayed more by bribery, rapacity and distance, than by objectivity and conscience.

The census of 1941 which reveals the population as about two thousand greater than in 1951, is also dubious. Even though a number of Hindu and Sikhs (not exceeding a thousand) emigrated from the state to India after that census was taken, nevertheless the decrease is considerable and is "...difficult to explain"—says the report. The possibility of a different standard of enumeration is again thought to be the reason for this.[5]

[5] *Census of Pakistan*, 1951, Vol. 4, p. 78.

Population growth during the last decade (1951-61) has been only seven percent. With the available data it is impossible to ascertain the trend of population with more certainty. But with developments which better the conditions of the people and also the improvement in medical facilities which lower the death rate and result in a higher birth rate, there is likely to be at least ten percent increase of population within the next decade.

Birth and Death Rates

No records showing the Birth and Death Rates in the country are available in the Additional Political Agent's office or in the census reports. So to base our calculations on the information available the following speculations would be possible.

The number of those above ten years of age is, according to 1961 census, 79,478 (Table 3), whereas it should have been 105,724, which was the total population for 1951. This means that during the last ten years there was a loss of (105,724—79,478) 26,246, who would have been now above ten years of age. The average death rate thus becomes 2,624 per year for those above ten years of age.

For the mortality rate of those below ten years of age we do not have any clues except the findings obtained from field work. This information which gives the average birth and infantile mortality rates, is obtained from twenty-three villages in different parts of the state (Table 11). The information which was obtained from the village headmen, had been duly confirmed by other villagers, but for obvious human reasons, these are liable to errors and so no complete accuracy can be claimed.

But at the same time it is believed that they represent reasonably useful data to indicate the general trend.

According to this information, the average infantile mortality is 3.4 percent and the average birth rate is 4.2 percent. The average number of children born alive on the whole, would be :

$$\frac{100 \times 110}{42} = \frac{113.057}{x} = 4,746$$

The total infantile mortality would be :

$$\frac{100 \times 10}{234} = \frac{4,746}{x} = 1,110$$

Thus the total death rate, excluding the children above one and below ten years of age, is raised to (2,624 above ten years of age+1,110 below one) 3,734. This is 3.3 percent against the total birth rate of 4.2 percent mentioned above.

The above results could be checked against the general trend of increase between the last two censuses of 1951 and 1961, which shows an increase of .7 percent per year.

Factors affecting the death and birth rates

The high mortality rate, especially in infants, is first of all due to the lack of necessary medical facilities and proper care, which are unknown in more than two-thirds of the population. Besides, with the insanitary surrounding and malnutrition which are the lot of majority of the people, it is a miracle not that so many die, but that so many are able to survive.

Diseases like typhoid, malaria, pneumonia and cholera are common and take their toll every year. Tuberculosis is wide spread.

The main reasons for the high birth rate are the universality of marriage and the low marital age. Excluding the children of below ten years of age, more than seventy percent of the population was recorded as married in the 1961 census (Table 5). This is because marriage is encouraged by the precept of religion and it becomes obligatory for everyone to get married and to beget children. The unmarried ones mainly (22 percent) include children between ten and twenty years of age. The reason of not getting married in case of men of above twenty years of age, is due to poverty. As far as women are concerned it is mainly because of unavailability of a suitable match.

Neither the thought of family planning has ever occurred to the people, nor can they afford it. At present the Government is trying to encourage such measures but due to the negligence of the masses, it seems unlikely that it will bear fruit in the near future.

Distribution and Density of Population

The distribution of population follows the lines of streams and rivers and is concentrated on the alluvial fans where water can be esaily obtained, or on the gentle slopes or hill terraces which have fertile stretches and where water is available (Fig. 1). The population of the sub-district, according to the 1961 census, was as follows :—

Table 2—Distribution and Population by Administrative Area

Administrative Division	Total	Males	Females
Chitral	22,865	11,589	11,276
Drosh	18,962	10,083	8,879
Lotkuh	13,017	6,630	6,387
Mastuj	21,616	10,869	10,741
Mulikhow	24,788	12,346	12,442
Torikho	11,809	6,204	5,605

Source : *Census of Pakistan*, 1961.

The density of population is twenty-five persons per square mile. This is low because of the vast tracts of barren mountains and glacier-bound valleys, which are uninhabited. This is made clear by Table No. 10, which shows the density of selected villages in the different parts of the state. The area of the summer pastures is not included in the village area. According to this, the highest density of population is in Chitral proper and Drosh which have above 1,000 persons per square mile. This is due to the market centres, offices and other state and government establishments, which are concentrated in these two centres, In the rest of the villages the density varies from eleven persons per square mile at Baroghil to 755 persons per square mile at Jughoor. The average density for all these villages is 433 persons per square mile.

Demographic Structure and Trends

The age structure is, quite expectedly, a typical one of the many peasant communities throughout the world, with an enormous base and rapid tapering. Here 50.4 percent of the total population is formed by those below twenty years of age and only 5.6 percent are above sixty.

If we compare the general age structure of 1961 (Table 3) with that of 1951 (Table 4), many important things suggest themselves. For instance :

1) The survival rate of children below ten years of age was 3.7 percent more in 1961 than in the previous decade.

Table 3—General Age Structure, 1961

Age Group	Both Sexes	Percent	Males	Percent	Females	Percent
0—9	33,579	29.7	17,026	15.0	16,553	14.7
10—19	23,408	20.7	12,243	10.9	11,165	9.8
20—29	16,790	15.0	7,809	6.9	8,981	8.1
30—39	15,188	13.3	7,636	6.7	7,552	6.6
40—49	11,291	10.0	5,965	5.3	5,326	4.7
50—59	6,434	5.7	3,588	3.2	2,846	2.5
60 and over	6,367	5.6	3,454	3.0	2,913	2.6
All Ages	113,057	100.0	57,721	51.0	55,336	49.0

Source : *Census of Pakistan*, 1961.

Table 4—General Age Structure, 1951

Age Group	Both Sexes	Percent	Males	Percent	Females	Percent
0—9	27,724	26	15,327	14.4	12,303	11.6
10—39	52,943	50	27,242	25.8	25,701	24.2
40—59	19,926	19	9,882	9.4	10,039	9.6
60 and over	5,225	5	2,424	2.3	2,801	2.7

Source : *Census of Pakistan*, 1951, Vol. 4, p. 77.

Note : Unfortunately, the report does not give age strucutre in detail except these broad groups. The reason it gives is the"...considerable inconsistencies which are perhaps more likely due to the inability of the people to make accurate reports .." about their ages.

2) 4.3 percent (2.2% Males and 2.1% Females) more people of the ages between ten and fifty-nine years, died during the last decade than the previous one.

3) The survival rate of those above sixty years, was 0.6 percent more than in 1951.

4) According to 1951 census, there were 1.7 percent more men of 10—39 age group than women of the same age, whereas, in 1961, they were of equal number.

5) There were 0.5 percent more women than men of above forty years of age in 1951, but the reverse has happened in 1961 when there was 1.7 percent more men than women.

6) On the whole there has been 0.4 percent decrease in males. In 1951, there were 930 females for every 1,000 males and in 1961 the females had increased to 942.

It is very difficult, apart from the suspecting nature of the figures, to put forward solid reasons for the various trends and changes mentioned above, because many things which have happened are confusing and cannot be explained. For instance, the survival rate increased in the case of those below ten years of age and those above sixty. On the other hand, it decreased in case of those between ten and fifty-nine years. There are no facts and figures concerning the causes of death by diseases, which would have helped to provide some clue to solve the question. Otherwise, it is difficult to isolate the factors which helped one age group to survive better but proved harmful to another.

Again, in 1951 women enjoyed more life expectancy than men, whereas the reverse was true in 1961.

Marital status (Table 5) is worthy of consideration, as the latest decade shows many new trends. There were about 4,000 more 'Ever Married'[6] women than men, which means an average of one out of every six Ever Married men is a polygamist.

The figures seem to be considerably exaggerated and misleading. There is no doubt that polygamy is practised in the state but is mainly restricted to the rich, who are only a fraction of the population. In 1951, there were only 1,200 more Ever Married women than men, which was not so unrealistic. But this sudden trend towards polygamy during the last decade is both un-understandable and unexplainable.

---

[6] 'Ever Married' includes Married, Widowed and Divorced. The report does not provide figures for each of these separately because the number of widowed and divorced is only a fraction.

TABLE 5—MARITAL STATUS, 1961

Age Groups	Ever Married		Never Married	
	Males	Females	Males	Females
0—9			17,026	16,553
10—19	2,628	4,685	9,615	8,480
20—29	4,650	8,010	3,159	971
30—39	6,367	7,104	1,269	448
40—49	5,197	5,050	765	276
50—59	3,472	2,257	116	589
60 and over	25,668	29,648	32,033	25,688

SOURCE : *Census of Pakistan*, 1961, *op. cit*, pp. 24 and 31.

According to various age groups, the following important points are brought forward :

1) 10—19 age group : This group represents the highest number of Never Married persons, for those above ten years of age, which means that the custom of early marriage is losing its grip.

2) 20—29 : This group represents seventy percent more Never Married men than women.

3) Fifty and over : Five times more women are Never Married.

4) 10—29 : Seventy-one percent more women are Ever Married than men.

5) 30—39 : Sixteen percent more women are Ever Married than men.

6) 40—49 : Ever Married men and women are, more or less equal.

7) Highest number of women are Ever Married in the age group of 20—29, while highest number of men Ever Married are in 30—39 years of age.

By comparing the conditions in 1961 with those of 1951 (Table 6), we find, besides the two percent more Ever Married women already mentioned, the following changes.

a) On the whole, there has been 7.8 percent decrease in Ever Married persons in 1961.

b) There has been 4 percent decrease in Ever Married of 10—39 years of age, while 0.7 percent increase in Ever Married women of the same age group.

c) In 1951 each age group of Ever Married persons included more women than men, but in 1961, we find this only in the 10—39 group. Above that there are more Ever Married men than women.

TABLE 6—COMPARISON OF EVER MARRIED PERSONS IN 1951 AND 1961

Age Group	1951 Males	Percent	Females	Percent	1961 Males	Percent	Females	Percent
10—39	17,054	16.1	17,861	18.8	13,645	12.0	19,799	17.6
40—59	9,781	9.2	9,951	9.4	8,669	7.6	7,307	6.4
60 and over	2,399	2.3	2,790	2.7	3,347	3.0	2,542	2.2
All Ages	29,399	27.6	30,602	29.0	25,688	22.6	29,648	26.2

SOURCE : *Census of Pakistan*, 1951, Vol. 4, p. 77.

SOCIO-DEMOGRAPHIC CONDITIONS

1) Literacy : There were 3,865 literates according to the 1961 census and the educational level is as follows :

TABLE 7—EDUCATIONAL LEVEL BY AGE GROUP

Age Group	Total Literates	Without formal attainment	Primary School	Middle School	Matriculation	Degree
All ages	3,865	139	1,666	1,777	186	97
	(188)	(2)	(140)	(43)	(3)	
0—9	255	—	209	46	—	—
	(8)		(7)	(1)		
10—19	1,445	55	608	740	42	—
	(39)	(2)	(34)	(3)		
20 and over	2,165	84	849	991	144	97
	(141)		(99)	(39)	(3)	

SOURCE : *Census of Pakistan*, 1961, *op. cit*, Part II, pp. 80-81. (Note : The figures in brackets shows the number of females).

During the last decade there has been a six times increase in the number of literates in comparison to previous decade. Especially the progress in the number of those who are having University Education and those who graduated by 1961, *i.e.* ninety-seven in total, is highly encouraging. The total number of students enrolled in the state was 5,312 in 1963 in the following order:[7]

High School 844, Middle School 1,271, Lower Middle School 1,271, and Primary 1,865.

TABLE 8—EDUCATIONAL LEVEL FOR 1951

Age Group	Total Literates	Without formal Attainment	Primary	Middle	Matriculation
All Ages	654 (136)	509 (136)	107	21	17
0—9	243 (63)	239 (63)	4	—	--
10 and over	411 (73)	270 (73)	103	21	17

Note : The figures in brackets show the number of females.

[7]Education Office, Chitral.

Less than thirty years ago, it is said, the number of literates could be counted on the fingers of one hand. This was due to the deliberate policy of the upper class who, kept education from common people. Things started changing after Mohammad Nasir-ul-Mulk's accession to the throne in 1936, whose first and wise step was to open schools and bring out his people from the darkness of ignorance. He was not fully successful in his mission, due to his short life, but he was able to lay the foundation of a new era.[8] After independence many more schools have been opening every year and where there were none thirty years ago, today there are three high schools, thirteen middle schools, seven lower middle and sixty-eight primary schools.[9] There is also a scheme for opening an intermediate college in the near future.

Every country has its own peculiar problems. The problems of education in Chitral is not shortage of teachers or lack of buildings, but shortage of students. The Kalash, Damili, Arandui, and Gojur tribes[10] seem to be very little interested in educating their children. The case of the Gojur is understandable due to their semi-nomadic nature. The Kalash think it to be against the laws of their gods and are also suspicious to being converted to Islam. The Damalis and Arandui have no excuse but their ignorance and primitive nature. There is a considerable number who cannot afford expenses for books, etc. for their children. It will take time for these problems to be solved.

2) *Means of Livelihood :*

According to the 1961 census a total number of 48,931 persons which included 14,326 females, supported themselves (Table 9). The rest, *i.e.* 23,116 males and 41,010 females, depend on the others. In the case of the males it would be obvious that the children below fifteen years of age, and men above sixty are dependents. But counting about forty percent of the females as dependents, besides those under ten years and over sixty years of age, seems very unrealistic. It is a fact that women, except the very old ones and the very young ones take full part in the household jobs and out-door work of agriculture as far as possible.[11]

The Table No. 9 indicates that eighty percent of the self supporting population depends on agriculture and twenty percent are engaged in other jobs. In this connection it is worth mentioning that agriculture and stock raising are closely associated in these regions though they have not been reported separately. Thus, except the ones mentioned under Pakistan State service and a few shop-keepers belonging to the Pathan tribe, more or less all the others depend on agriculture. Those who are in the Chitral State service do their agricultural work by paid labour or through servants.[12] Those who are spinners, weavers, wood workers, blacksmiths and

---

[8]Israr-ud-din, A Social Geography of Chitral State (M.A. Thesis, University of London, 1965), Chapter 2.

[9]Education Office, Chitral.

[10]*Op. cit.*, pp. 79–102.

[11]*Ibid.*

[12]A servant is generally not paid but he shares all the facilities and comforts which are enjoyed by his master. At the same time he is free to leave him any time he likes. Many who remain loyal to their masters are rewarded by lands and houses, at the end. Also see Chapter 6, for tenancy system.

so on, do their jobs only when they are free from the agricultural work. Even the labourers, who usually have to work far from their homes, are never indifferent to their main agricultural occupation and return for the sowing and harvesting.

The other jobs like water, weeding, etc. are either carried out by women and children or relatives. Briefly, though, the Chitrali have many occupations from time to time, their main concentration is on agriculture [13]

A detailed study of the seasonal movement of these labourers, from or to the various villages, would offer interesting phenomena if compared to crop growing season in the country. Unfortunately the unavailability of data makes it as yet impossible.

TABLE 9—OCCUPATION IN 1951 AND 1961

No.	Occupation	1951			1961		
		Both sexes	Males	Females	Both sexes	Males	Females
1.	Agriculture	27,965	27,965	—	39,321	29,791	9,530
2.	Barber	75	75	—	22	22	—
3.	Blacksmith	90	90	—	376	360	16
4.	Woodworker	77	77	—	185	168	17
5.	Doom (Musician)	—	—	—	4	4	—
6.	Driver (Lorry)	—	—	—	10	10	—
7.	Driver (Tonga)	—	—	—	3	3	—
8.	Embroidery	192	—	192	3,941	413	3,528
9.	Goldsmith	—	—	—	15	15	—
10.	Immamat (Religious worker)	131	131	—	185	185	—
11.	Labourers	—	—	—	1,953	1,527	426
12	Mechanic fitter	—	—	—	7	7	—
13.	Medical practitioner	—	—	—	11	10	1
14.	Miller	—	—	—	193	137	56
15.	Potter	—	—	—	83	62	21
16.	Pakistan State Service	255	255	—	1,037	1,033	4
17.	Chitral State service	1,863	1,863	—	90	90	—
18.	Domestic services	194	194	—	57	6	51
19.	Shopkeepers	—	—	—	342	342	—
20.	Shoemakers	57	57	—	62	57	165
21.	Spinning	154	154	—	170	5	165
22.	Tailor	136	—	130	240	234	6
23.	Washerman	1	1	—	3	3	—
24.	Weaver	89	66	23	621	120	501
	Total (self-supporting)	31,279	30,774	505	48,931	34,604	14,327
	Total (Dependents)	74,445	24,106	50,339	75,126	23,117	41,009

SOURCE : *Censuses of Pakistan*, 1951 and 1961.

[13] When a Chitrali was asked in an interview : "How many weavers are there in Chitral ?", he answered, "More than a hundred thousand."

"How many washermen"?

"More than a hundred thousand"

"How many carpenters"?

"More than a hundred thousand".

"...and what is the population ?"

"Over a hundred thousand ... but everyone does more than half a dozen jobs".

The above figures are mostly misleading and unreliable. Especially the figure which shows twenty times fall in Chitral State Servants, is far from truth. Because of the introduction of the new administrative system in 1953, many new departments and offices were established in the state and which increased jobs twice more than before. Apart from that, there are at least three times more labourers and shop-keepers, four times more barbers, ten times more washermen, and fifteen times more domestic servants in the state than shown in the above figures for 1961. As far as the census of 1951 is concerned, all the figures, except Nos. 2, 3, 8, 10, 16, 17, 20 and 22, seem to be inaccurate.

TABLE 10—DENSITY OF POPULATION OF SELECTED VILLAGES IN THE DIFFERENT PARTS OF THE STATE (CENSUS 1961)

No.	Village	Population	Area	Density	Remarks
1.	Ajaran	280	1 sq. m.	290 P/SM	
2.	Arandu+Gol	1,590	4	398	
3.	Baranis	1,680	2½	672	
4.	Baraghil	336	30	11	Above 1,200 ft.
5.	Brep	1,280	3	427	
6.	Buni	2,390	8	300	
7.	Chitral	4,500	4	1,125 P/SM	Concentration of shops, office and other establishments.
8.	Drosh	4,224	4 sq. m.	1,056 P/SM	Do.
9.	Gobor	315	6	52	
10.	Istaru	600	1	600	
11.	Jughorr+B. Abad	1,510	2	755	
12.	Khot	3,161	10	316	
13.	Kogoozi	1,000	2½	400	
14.	Kosht	2,903	6	484	
15.	Kusham	2,107	3½	602	
16.	Madaglasht	1,680	10	168	
17.	Mustag	2,172	3	724	
18.	Rashun	1,376	3	459	
19.	Rayin	906	1½	604	
20.	Shogore	266	½	532	
21.	Siah Arkari	240	1	240	
22.	Singoor	1,333	3½	380	
23.	Zani, etc.	2,582	7	369	Included the villages of Warijun, Gahrt, Norgram, Uthul and Shunu.

SOURCES :

1. Population figures are obtained from the office of the Additional Political Agent, Chitral.
2. Area of the villages is based on the Ordinance Survey Maps of India.

Note : The village areas do not include the summer pastures.

TABLE 11—AVERAGE INFANT MORTALITY RATE IN VARIOUS VILLAGES OF CHITRAL STATE

No.	Village	Births	Infants died	Population
1.	Ajaran Deh	13	3	280
2.	Arandu+Gol	53	10	1,590
3.	Baranis	31	5	1,680
4.	Brashgram	20	3	807 (Tashqar included)
5.	Brep	15	7	1,280
6.	Buni	115	39	2,396
7.	Chitral	165	50	2,500
8.	Gobor	20	7	315
9.	Kiyar	12	3	268
10.	Kogoozi	22	4	1,009
11.	Lasht (Yarkhoon)	10	5	315
12.	Laspur valley	130	31	2,774
13.	Madaklasht	60	15	1,680
14.	Mogh	18	5	567
15.	Oweer valley	75	7	3,775
16.	Owirk	15	5	700
17.	Parabeg	19	7	900
18.	Rach+Uzhnu	55	27	1,524
19.	Rayin	65	20	906
20.	Siah Arakari	19	5	240
21.	Sonogoor	45	15	1,500
22.	Werkhop	49	15	840
23.	Zani &etc.	95	32	2,582
Total		1,369	320	32,428
		42%	234%	

SOURCES :

1. Population figures are obtained from the A.P.A Office, Chitral.
2. Birth and Mortality figures are based on field work.

GEOGRAPHICAL RECORD

KAZI S. AHMAD 1904—1970

IQTIDAR H. ZAIDI

Professor Kazi S. Ahmad died of heart failure on November 28, 1970 in Lahore. The news of his death came as a shock to every one who had known him either through his person or his works. It is not only because his death was sudden, but also because he was so much respected and liked—rather adored, by his students, colleagues and friends. His contributions to advancing the cause of geography as a field of learning and research in the Pak-Indian subcontinent make him immortal. He was one of the doyems of geography in the sub-continent. With his death the first generation of geography in Pakistan comes to an end. The Pakistan geographers have lost in him a great patron.

Kazi Said-ud-Din Ahmad was born in March 1904 at Sikandrabad in the district of Buland Shahr, Uttar Pradesh, India. After having received his early education in his home town he proceeded to the famous Muslim University at Aligarh and completed his education there receiving the degrees of M.A. (Geography) and LL.B. in 1926. He worked for his M.A. Degree with Major Dane, a British geographer, the first Chairman of the Department of Geography at Aligarh. Kazi S. Ahmad belonged to the batch of first Indians to receive M.A. degree in Geography, and soon after he was appointed on the staff of the Department of Geography at Aligarh. He proceeded to U.K. in 1936 and obtained a Ph.D. in Geography from the University of London in 1939. As a geographer he impressed his advisor and colleagues in London so much that in addition to his work as a Ph.D. student he was also called upon to teach honours classes at the University College, London, during the year 1938-39. On his return from London he continued to serve the Department of Geography at the Muslim University, Aligarh till 1945, when he was offered headship of the Department of Geography of the University of the Punjab as a Reader. Here he had the opportunity to organize a new department for post-graduate teaching and research. In addition, since the University of the Punjab was an examining body for all the examinations from Matriculation to B.A., the responsibility of scheduling syllabi of courses for all the classes from school level to B.A., falling within the territorial jurisdiction of the province of British Punjab, devolved on him, and the duties related to such enviable position were discharged well with full enthusiasm and sagacity. After independence in 1947 the bounds of his responsibility, as the senior most geographer in Pakistan, extended all over the young country of Pakistan. He played an important role in the development of geography departments at the other universities in the country, namely, Karachi, Sind, Peshawar, Dacca and Rajshahi. All the present heads of the departments of geography at various universities in Pakistan happen to be his pupils. He was so much interested in seeing geography flourish and encouraging students that he instituted a Kazi Saeed-ud-Din Ahmad Medal to be awarded every year to the student who secured highest marks in geography in the B.A/B.Sc. examination of the Panjab University. In 1964 he became the Dean of the Faculty of Humanities and Social Sciences of the Punjab University. After having most successfully concluded his brilliant career of forty years (19 years at Aligarh and 21 years at Lahore) as a University teacher he retired on September 30, 1966. During his stay in the department he taught M.A. courses and guided several M.A. and Ph.D. theses including students from abroad, particulary from U.K. and West Germany. One will find his devotees not only in India and Pakistan but in U.K. and Germany as well. In recognition of his valuable services to the Punjab University and his standing as a scholar of international fame the University of the Punjab appointed him as Professor Emeritus in 1966. However, because of his highly respected personality, wide experience, quick grasp of the University problems and maturity of judgement, the University felt that his active participation

KAZI S. AHMAD 1904—1970

in the affairs of University administration was needed, and hence he was re-employed as Director of the Department of Students Affairs in the same year and continued till 1969 when he finally retired on his own instance though from active service in the Punjab University.

On the national scene Professor Kazi S. Ahmad was in fact the Dean of the Geographers of Pakistan. He was President, Pakistan Geographical Association ever since its establishment in 1948. To promote scholarship and help disseminate geographical knowledge he began the publication of *Pakistan Geographical Review* and remained its Editor till 1966. He also served as the Chief Editor of the Punjab University Journal of Scientific Research in 1966. He was Director of the National Atlas Board, an organization in the creation of which he played the most important role. This was a Government project for the publication of a comprehensive atlas of Pakistan. He presided over several national meetings. He was the first President of the Section on Geography, Geology and Anthropology in All Pakishan Science Conference, Dacca, 1950. He presided over the First All Pakistan Geographical Conference, Karachi, 1964. He was a Fellow of the Pakistan Academy of Sciences (the only geographer). He was associated with many specialist committees set up by the Government of Pakistan and India before independence. He represented Pakistan at the meeting of the British Association of the Advancement of Science held at Cambridge in 1965.

Professor Ahmad was equally active and respected on the international scene as well. He participated and presided over several International Conferences and Commissions held in Asia, Europe, North and South America and contributed papers. He served as one of the Vice-Presidents of International Council for the Study of Afro-Asian Geography, as a member of the Arid Zone Commission and Commission on National Atlases set up by the International Geographical Union. He was a sectional Chairman of the Symposium on urban studies organized by the International Geographical Union at Edinburgh. It was in recognition of his services to geography that the Royal Geographical Society, London, on the occasion of 20th International Geographical Congress held in London in 1964, conferred upon him Honorary Corresponding Membership. It may be noted that this honour was conferred on only eleven geographers of the world. The same year he was elected by the Royal Scottish Geographical Society, Edinburgh, as its Honorary Life Member. He was also elected Fellow of the Scottish Geographical Society. Again he happened to be among the chosen few one of the thirteen persons from all over the world.

He was a versatile writer. In addition to a large number of papers that he wrote for the *Pakistan Geographical Review* and various conferences, he contributed a good number of articles to *Encyclopaedia Britannica* and *Encyclopaedia of Islam*. He was so active a writer that even upto the last moment he was busy in correcting the proofs of the urdu version of his book *Major Natural Regions*. He also left, at the time of his death, several unfinished articles for *Encyclopaedia Britannica*. His text books in English and Urdu for school and college students will continue to be regarded as useful for long. A complete bibliography of his publications is given at the end of this memorial.

Another important aspect of his life was Professor Ahmad's close association with the Pakistan Movement. He happened to be one of the five members of the committee of writers appointed by the All India Muslim League. In this capacity he published a number of articles for the consumption of newspapers. He also wrote several pamphlets in Ashraf Publications Series in support of Pakistan, and advised Muslim League in all geographical aspects of the Pakistan Movement. It was in acknowledgement of his scholarship and great service to the nation and cause of education that in 1963 the Government of Pakistan honoured him with the title of Sitara-i-Imtiaz (the star of distinction). His sincere services to Pakistan, to the cause of education, particularly to geography, affable nature, affectionate behaviour with his pupils and younger colleagues, scholarly openmindedness and friendly feelings will always be remembered by every one who came in contact with him.

Late Professor Kazi S. Ahmad is survived by his wife, five sons, two daughters and several grandchildren. May his soul rest in peace.

Bibliography

Agricultural Geography of Punjab, (Ph. D. Thesis, University of London, 1939, Unpublished).

"Geographical factor in the production and distribution of wheat in the Punjab"; *Calcutta Geographical Review*, Vol. 5, No. 2 (1943).

"A Scale of units", *Indian Geographical Journal*, Vol. 15, No. 2 (1940).

"Environment and the distribution of population in India", *Indian Geographical Journal*, Vol. 16, No. 2 (1941).

"Physiographic Divisions of India", *Indian Geographical Journal*, Vol. 16, No. 3 (1941).

"Settlement in the Irrigated Area of Recent Colonization in the Indo-Gangetic Plain", *Indian Geographical Journal*, Vol. 17, No. 3 (1942).

"Agricultural Regions of the Punjab", *Pakistan Geographical Review*, Vol. 1 (1942).

"Economic Holding in the Punjab", *Indian Geographical Journal*, Vol. 18, No. 1 (1943).

"Intensive Farming in the Punjab", *Indian Geographical Journal*, Vol. 19, No. 1 (1944).

"Politico-Regional Divisions of India", *Indian Geographical Journal*, Vol. 19, No. 3 (1944).

"The Communal Pattern of India", *Indian Geographical Journal*, Vol. 19, No. 4 (1944).

"Physiography of the Punjab Plains", *Pakistan Geographical Review*, Vol. 2 (1944).

"Land Utilization and its Regional aspects in Pakistan", *Pakistan Geographical Review*, Vol. 3, Nos. 1 and 2 (1948).

"Land Utilization Survey in Pakistan", *Pakistan Geographical Review*, Vol. 4, No. 1 (1949).

"A Politico-Regional Plan", *Pakistan Geographical Review*, Vol. 4, No. 2 (1949).

"The Role of Geography in our National Planning," *Pakistan Geographical Review*, Vol. 5, No. 2 (1950).

Major Natural Regions (A treatment of the world on the basis of natural Regions). The Carvan Book House, Lahore (1950).

"Climatic Regions of West Pakistan", *Pakistan Geographical Review*, Vol. 6, No. 1 (1951).

"Climatic Regions of East Pakistan", *Pakistan Geographical Review*, Vol. 7, No. 2 (1952).

"Distribution of Population in Pakistan", *Pakistan Geographical Review*, Vol. 8, No. 2 (1953).

"Regional Balance in Pakistan", *Proceedings of the International Geographical Congress, 1952* also in *Pakistan Geographical Review*, Vol. 9, No. 2 (1954).

"Urban Population in Pakistan", *Pakistan Geographical Review*, Vol. 10, No. 1 (1955).

"Geographical Study of the Refugee Population and some of its Problems", *Pakistan Geographical Review*, Vol. 10, No. 1 (1955).

"Pakistan-Bine Zusammenfassenda Studie-Geographische", *Rundschau*, No. 19, West Germany, October (1955).

"Agricultural Development of West Pakistan", *Pakistan Geographical Review*, Vol. 11, No. 1 (1956).

"Hydro-electric Development of West Pakistan", *Pakistan Geographical Review*, Vol. 11, No. 2 (1956).

"Distribution of Wheat in Pakistan", *Pakistan Geographical Review*, Vol. 12, No. 2 (1957).

"Water Supply in the Indus Basin and Allied Problems", *Proceedings of the International Geographical Congress*, 1956, also in *Pakistan Geographical Review*, Vol. 13, No. 1 (1958).

"Natural Gas in Pakistan", *Pakistan Geographical Review*, Vol. 13, No. 2 (1958).

"Variations of Moisture Types and their bearing on Soil Erosion in West Pakistan", *Pakistan Geographical Review*, Vol. 14, No. 1 (1959).

"Evolution of Drainage in the Indus Plain", *Pakistan Geographical Review*, Vol. 15, No. 2 (1960).

"Reclamation of Waterlogged and Saline Lands in West Pakistan", Symposium on Agrarian Geography, Denmark, *Pakistan Geographical Review*, Vol. 16, No. 1 (1961).

"Growth of Settlements in West Pakistan", *Proceedings of the International Geographical Congress*, Stockholm (August, 1960) also in *Pakistan Geographical Review*, Vol. 16, No. 2 (1961).

"Variability of Rainfall and its bearing on Agriculture in the Arid and Semi Arid Zones of West Pakistan", contributed to the Arid Zone Commission of the International Geographical Union, Stockholm, 1960 also in *Pakistan Geographical Review*, Vol. 16, No. 1 (1961).

"Geography Through the Ages", Presidential Address, First All Pakistan Geography Conference, Karachi, also in *Pakistan Geographical Review*, Vol. 19, No. 1 (1964).

"Woollen Textile Industry in Pakistan", *Pakistan Geographical Review*, Vol. 19, No. 2 (1964).

"Some Geographical Aspects of the Indus Waters and Development of Irrigation in West Pakistan", contributed to Section on Applied Geography of the Inter national Geographical Congress, London, 1964. *Pakistan Geographical Review*, Vol. 20, No. 1 (1965).

"Sugar Factory Industry of West Pakistan", *Pakistan Geographical Review*, Vol. 20, No. 2 (1965).

"Urbanization Trends in West Pakistan ; A Geographical Analysis", contributed to the Symposium on Urban Geography at Edinburgh under the auspices of the International Geographical Union, *Pakistan Geographical Review*, Vol. 21, No. 1 (1966).

"Cotton Textile Industry in Pakistan", *Pakistan Geographical Review*, Vol. 17, No. 2 (1962).

"Land Use in the Semi-Arid Zone of West Pakistan", contributed to the colloqium on Arid Zone, Greece, 1962 ; *Pakistan Geographical Review*, Vol. 18, No. 1 (1963).

"Pakistan", *Developing Countries of the World*, Published by the International Geographical Congress, Delhi (1968).

A Geography of Pakistan, Oxford University Press, Karachi (1964).

Basic Industrial Resources of the U.S.S.R. Theodore Shabad, Columbia University Press, New York, (1969). xiv, 393 pp., maps, bibliography, index.

There cannot be a more formidable barrier in the dissemination of scholarly knowledge than lack of proficiency in foreign language. This kind of handicap becomes more painful especially with reference to those countries where the scholars and various government and private agencies are politically busy in producing useful literature, i.e., books, research papers, monographs and other forms of data compilation. Our knowledge about the various aspects of the geography of U.S.S.R. is extremely meagre because we, due to language barrier, do not have ready access to the original sources of knowledge about it. Therefore, any book which provides us access to knowledge about the geography of U.S.S.R. must be more than welcome. Theodore Shabad has done a great service by producing *Basic Industrial Resources of U.S S.R.* for our consumption. Shabad is a well known writer, journalist especially with reference to his works on U.S.S.R and China. In this book Shabad has endeavoured to present a deeper, though descriptive, understanding of the developments, particularly of extractive and raw material oriented industries of the Soviet Union.

The book is primarily divided into two parts. The first part focuses on the production trends and changing locational patterns of the industries in the U.S.S.R.; namely fuel industries, electric power, metal industries and chemical production. In the second part a more detailed survey of the industrial centers by regions has been presented. However, the major emphasis is laid on the development during the past two decades. Shabad has attempted to collect data from all available sources, greatly scattered though, and has succeeded in organizing them into a coherent whole. In addition to general comments on locational advantages, Shabad provides, while describing regional complexes, useful information regarding the historical background, output and capacity.

However, the book hardly presents discussions which would satisfy conceptual needs, or excite intellectual curiosity, perhaps because it is not the stated purpose of the book. It is an interestingly written useful reference book on the industrial resources of U.S.S.R. No matter how impressive the bibliography may be, the importance of footnotes cannot be exaggerated. In this book Shabad choses to give only bibliography and has ignored footnotes which could have been useful for the scholars interested in the industrial geography of the Soviet Union.

QUDSIA AZIZ

Kinnaird College for Women, Lahore

Eastern Europe. Norman J.G. Pounds. Aldis, Chicago and Longmans, Green, London (1969), xx, 912 pp., illustrations, maps, diagrams, bibliography, index. $ 12.75. (Geography for Advanced Studies Series).

Any book from a mature and seasoned author like Professor N.J.G. Pounds, who has extensively written on Europe would always be welcome by geographers. More so if the book is written on areas for which the original sources of information are inaccesible because of language or other difficulties. Eastern Europe is such area for which dearth of reliable up-to-date material cannot be denied. Inaccessibility to such materials is a serious limitation for Pakistani geographers who are generally neither adequately acquainted with the language of any of the Eastern European countries nor do they have facilities for field work in these areas. The book is therefore of special interest to Pakistani

geographers. Professor Pounds must be congratulated for having added such a voluminous book to an existing stock of English language books on Eastern Europe.

However, to accept it uncritically would be our folly, clarity of expression and neatness of presentation certainly play an important role in improving the quality of the book. But, unfortunately, the overall character of the book remains unbalanced. The first part of the book treats Eastern Europe as a whole, giving a general outline of the physical landscape, population, political history, and material development. A review of the economic changes has also been presented in this part. The second part deals with individual countries and their sub-areas. The treatment is, however, traditional and does not present more than an inventory of the various physical and cultural aspects. It is, therefore, dull and hardly arouses intellectual curiosity. Then again, the statistical data used in this book are not up-to-date either, the most recent being those of 1966.

The modern regional geography is much more than simple description of various physical, biotic, social, economic, political and cultural aspects of an area. The whole gamut of information needs to be integrated in such a fashion as to present the area as a functional whole. This approach is conspicuously lacking. Thus in spite of its impressive volume value of the book remains limited to undergraduates. However, the book may serve as useful reference for the graduate students as well as for all those who have no access to original material.

NARGIS NAQAVI

Mohammad Pur College, Dacca

PAKISTAN GEOGRAPHICAL REVIEW was instituted in 1949 replacing Punjab Geographical Review which was started in 1942. The object of this publication is to further dissemination and exchange of scholarly knowledge. Its volumes contain research articles on various topical and regional themes of Geography with particular reference to Pakistan. The Review is published half-yearly in January and July.

Submit all manuscripts and publications for Review to the Editor, Pakistan Geographical Review, Department of Geography, University of the Punjab, Lahore.

Address all communications regarding subscriptions and purchase of the back numbers to the Manager, Pakistan Geographical Review, Department of Geography, University of the Punjab, Lahore.

SUBSCRIPTION

Annual Rs. 10.00 / $ 3.90, £ 1.

Single Copy Rs. 5.00 / $ 1.50, 10s.

Back Numbers

Volumes 1 and 3 Not available.

Volumes 2 to 13 Rs. 5.00 / $ 2.00 or 5s each volume.

Volumes 14 to 19 Rs. 8.00 / $ 2.00 or 5s each volume.

Volume 11, Number 2, 1956 contains index from volumes 1 to 10.

Volume 17, Number 2, 1962 contains index from volumes 11 to 17.

Volume 22, Number 2, 1967 contains index from volumes 18 to 22.

Published by K. U. Kureshy, Editor, Pakistan Geographical Review
Printed at the Pakistan International Printers, 118. G. T. Road, Moghalpura, Lahore.