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## Shift Working, Employment and Economic Development: A Study of Industrial Workers in Pakistan

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CENTER DISCUSSION PAPER NO. 181

SHIFT WORKING, EMPLOYMENT, AND ECONOMIC DEVELOPMENT:  
A STUDY OF INDUSTRIAL WORKERS IN PAKISTAN

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June, 1973

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SHIFT WORKING, EMPLOYMENT, AND ECONOMIC DEVELOPMENT:

A STUDY OF INDUSTRIAL WORKERS IN PAKISTAN\*

by

Ghazi M. Farooq

and

Gordon C. Winston

This paper reports on a survey done in 1971 on industrial workers in Pakistan to study shift-working and its effects on workers in a less developed country (LDC). A number of investigations have been conducted in advanced industrial economies and an increasingly clear picture of the effects of shift-working on workers there has emerged [3, 5, 9]. In LDCs, in contrast, there have been no previous studies although increasing amounts of shift work appear desirable in these capital-scarce societies.

A most common characteristic of LDCs is their lack of capital--the tools of production. So the recent discovery that the capital already installed and operating in poor countries is idle most of the time is both disheartening and promising. Available estimates show industrial capital idle roughly 85 percent of the time in Pakistan [8] and South Korea [4]. Figures like these are disheartening because very low levels of utilization represent a waste of scarce capital and employment opportunities. Yet they are

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promising because they suggest considerable scope for reducing that waste by increasing capital utilization as we increasingly discover the reasons why capital utilization is so low [10].

Any substantial increase in capital utilization must increase the amount of shift-working. Much of the increase in employment must come from employment at night and much of the increase in output must be produced at night. Therefore, any development policy designed to increase capital productivity and employment through increased capital utilization immediately encounters two questions of primary social concern:

1. Is shift-working humane? Or put less dramatically, must shift-working carry social costs that more than offset the benefits of increased output and employment achieved through increased capital utilization? If on these grounds shift-working is justified, there remains the further question

2. What social resistance will increased shift-working encounter and by which policies might that resistance most effectively and humanely be reduced?

These are the questions to which the present study is addressed. Part I will present a brief summary of the results of earlier investigations of workers in advanced countries. Part II reports the results of the survey of Pakistani workers, describing the characteristics of shift workers and day workers, the physiological effects of shift-working, the workers' sense of its problems, and their expressed preferences for work schedule. Part III summarizes and draws some implications of this study for economic development policies.

I. The Social Costs of Shift Work: Advanced Country Evidence

For the worker the major characteristics of shift-working are:

(a) that his activities are in conflict with both his internal physiological rhythms and with social activity patterns and, (b) for rotating shift workers, that his work rhythm is changed repeatedly necessitating repeated changes in his eating, sleeping, and activity patterns.

Physiologically, a number of body rhythms naturally coincide with diurnal (day/night) rhythms. This is a new and growing field of biological and psychological investigation [7]. When work schedules break this natural coincidence, two questions become important: (a) at what cost do body rhythms conflict with the natural diurnal rhythm? (b) how fast can body rhythms adjust to new schedules? The first is especially relevant for "fixed shift" workers, those who work at the same time every day, say midnight to seven A.M. Both are relevant for the "rotating shift" worker who constantly changes his work schedule, usually once every week.

The evidence from advanced countries on the effects of and workers' attitudes toward shift-working was gathered largely by medical doctors and social and industrial psychologists [5, 6a, 3S]. It is summarized by Mott, et al. [5, Ch. II], Walker [3S, Paper I], and Winston [9]. Overcoming early presumptions that shift work is "obviously" inhumane, these investigations have increasingly focussed on shift-working in a more analytical way, assessing the major problems encountered by shift workers and the determinants of shift-working preferences. The picture that emerges is one of considerable worker adaptability that leaves relatively minor personal and social costs of working shifts. The costs are virtually non-existent for the least demanding shift

patterns and in the most shift-concentrated geographical areas. At worst, they are considered well compensated for in advanced countries by payment of shift wage premia.

Time patterns of sleeping, eating, and elimination are felt to be among the most "basic" of physiological adaptations to rhythms of night and day and the most difficult to change with shift-working. Physiological effects of work schedule are reflected in sleeping and eating complaints while perception of general health provides an additional if less precise measure.<sup>1</sup>

The most ambitious study of U.S. shift workers concluded that "the central problem of working shifts is getting adequate sleep" [5, p. 235]. Yet the most striking result of the empirical studies in general is the large proportion of workers (30 to 80 percent) who profess to no problems of repeated sleep adjustment. For those who did have problems, both the quantity of sleep (too little) and its quality (restlessness) were involved and they seemed to be the result of both workers' slow adjustment to changing shifts and the conflict with different activity patterns that surround the workers as they try to rest.<sup>2</sup> The ease of adjustment for rotation depends on the shift; it is easier to adjust to day shift than to night shift. The major "quality" problem of sleep, for both rotating and fixed shift workers, is

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<sup>1</sup>Most studies accept worker perception of these problems rather than, say, the much more expensive alternative of medical examination.

<sup>2</sup>Since sleep adjustment problems were always most severe for the first few days after a shift change, Walker suggested that the weekly rotation might be the most demanding possible schedule with neither enough time to adjust between rotations nor enough speed of rotation to ride over adjustment without considerable fatigue [3S, p. 89].

noise. This suggests that their conflict with the activity patterns of other members of their societies--people--is particularly difficult. Rotating shift workers appear to fare worse in this respect than do fixed shift workers; the latter are apparently able to demand greater cooperation from their environment.

Appetite and digestion appear to be influenced mildly by changing shifts: appetite is best on day shift and worst at night but more than a quarter of rotating shift workers encountered no problems; elimination responds in the same way but with even more mild effects.

There is virtually no evidence from advanced countries that shift work effects workers' perceptions of their general health, except positively. Gastrointestinal disorders and ulcers among shift workers have been studied since 1948 but no clear association has emerged. In the Mott study, the "Index of General Health" (based on frequency of health complaints) was worst among day workers, followed by afternoon workers, night workers, and, finally, rotating shift workers [5]. This surprising absence of ill effects of shift work, may be due largely to self-selection--that only the strong have survived the rigors of shift work. This hypothesis is supported both by the fact that those who have the least problem with basic body rhythms are workers who have had a number of years of shift work experience and by the contrary evidence presented for Pakistan in Part II.

Efforts to find indirect evidence of physiological and psychological effects of shift-working in systematic differences in absenteeism, accidents or levels of productivity have been unavailing. Absenteeism is reported to be slightly lower among shift workers; accidents are no more frequent at night; and there is no clear evidence on difference in productivity levels.

The information from these studies on social and psychological affects of shift-working on workers' attitudes and the formation of preferences is often difficult to interpret, but some important patterns emerge. It is clear that the premium wage rate paid for night work heavily conditions workers' reactions to shift-working. In the excellent study by the UK Prices and Incomes Board, both workers and their wives saw "higher earnings" as the most distinguishing characteristic of shift work [3, 3S]. A geographical concentration of shift-workers, too, influences workers' attitudes toward shift work--in "shift-working towns" workers are much more favorably disposed toward shifts. The educational level of the worker conditions his acceptance of shift-working in advanced countries; the better educated the worker, the less he prefers shift-working. Finally and importantly, the particular shift work pattern clearly affects preferences with the greatest acceptance registered for fixed shift work (no rotation). The most popular among fixed shifts is afternoons. The subjective costs of adjusting work rhythms appear to be higher than the costs of working in conflict with society, per se. And preference for the afternoon shift complements the findings that afternoon workers sleep and eat better than others and that fixed shift workers make a better adjustment to (or demand a better adjustment from) their surroundings.

A very important characteristic of the way these advanced country studies were done is that the workers whose preferences were studied were, without exception, employed. All the comparisons made, both by workers and by the scholars studying them, were between different work patterns assuming, always, continued employment. This alone makes some of their conclusions of dubious relevance for LDCs.



## II. The Evidence from a Developing Country

The above mentioned investigations largely determined the shape of the study for Pakistan. We want to know if LDC workers react the same way. Can we simply extrapolate the evidence from advanced countries on the costs of shift-working or are the circumstances in LDCs so very different that shift-working has different issues, raises different issues and encounters different problems? It was these questions which we hoped the Pakistan study would begin to answer.

In this part we describe the results of the Pakistan survey. After a brief description of shift-working patterns in Pakistan, of the sample (more fully described in the Appendix) and the characteristics of the shift workers, we present our findings on the effects of shift-working--physiological, attitudes and preferences--on shift workers. Because of the relatively greater importance of unemployment in LDCs, we conclude with a discussion of the attitudes of unemployed workers.

### A. The Survey

The sample survey on which this study is based consists of interviews of 363 industrial workers (312 employed and 51 unemployed) in Karachi and Lyallpur, the two largest industrial cities in Pakistan. The interviews were conducted in the worker's native language in his residence; not on the factory premises. The survey was carried out in three large labor residential areas of Karachi and three in Lyallpur during April and May 1971. As no sampling frame existed, a simple cluster sampling design was used. Since the primary objective was to get a satisfactory cross section of workers in terms of work pattern, as well as by types of industry and ethnic background, the

sample is not representative in terms of the distribution of workers among shifts.

A variety of work patterns is found in Pakistan with the eight-hour day dominating. The two most typical patterns are: (a) an eight-hour day-time work day starting at 7 or 8 A.M. ("day work"), and (b) an eight-hour work day rotated over three shifts starting (typically though not rigidly) at 7 A.M., 4 P.M. and 11 P.M. ("three-shift rotating"). Together, these two work patterns account for 87 percent of the workers in the sample. Other work patterns are: (c) a twelve-hour work day on rotating day (7 A.M. to 7 P.M.) and night (7 P.M. to 7 A.M.) shifts ("alternating day/night"), (d) a twelve-hour work day during the day only (counted as "day work"), (e) a rotating eight-hour "double-day" shift--one shift early morning to early afternoon (generally 5 A.M. to 10 P.M.), and finally, (f) a rotating eight-hour afternoon (4 P.M.)-night (11 P.M.) pattern.

The distribution of work schedules among those surveyed allows fairly firm analysis of differences between day workers and shift workers as well as, among shift workers, of differences between the three-shift eight-hour pattern, the alternating two-shift twelve-hour schedule, and the "double-day" shift pattern. Beyond that, the variety of shift patterns in the sample is inadequate for more than suggestive analysis. The loss of information on differences between fixed and rotating shift patterns is particularly unfortunate in light of the advanced country evidence that the fixed shift work is far more humane than the rotating patterns which predominates in Pakistan. And it is worth noting that no bizarre shift patterns like Japan's twenty-four hour work day appeared [4a].

B. Characteristics of Shift Workers

Shift workers in Pakistan were older, had more years of industrial experience, were less well educated, and were more likely to be married than were day workers. Over half of those working shifts (51 percent) were older than thirty compared with only 37 percent of the day workers.<sup>3</sup> Over half the shift workers (51 percent) had more than ten years of experience in industrial work while only 34 percent of the day workers had worked that long. Day workers were better educated with 20 percent having completed more than eight years of school compared with only 7 percent of the shift workers. It should be noted, though, that the average amount of schooling was meager for both-- 3.7 years for day workers and 2.9 for shift workers. Finally, 66 percent of the shift workers compared to 54 percent of the day workers were married.

The relatively older age of shift-workers and their relatively more experience with industrial work strongly suggest that shift working is not used as a job ladder entry point in Pakistan but, rather, that shift workers are a seasoned group in jobs where shift working is required. Four-fifths of the shift workers reported themselves as "skilled" in contrast to 63 percent of the day workers. Most of their work in industry had been in shift-working, they reported an average of 9.5 years of shift experience out of the average of 11.3 years of industrial work experience.

It is interesting that no difference appeared between shift workers and day workers by area of origin. In the ethnically community-conscious Sub-continent, one might expect differences in the proportion of Indian-born "refugees" or differences among "natives" (Punjabis in Lyallpur; Sindis in

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<sup>3</sup>Shift workers' average age was 31.9; day workers', 29.9.

Karachi) and immigrants (largely Northwest Frontier Province in Karachi) but no such patterns appeared.

Also, there is no support for the hypothesis that shift-working is often sought after in an LDC because it conveniently allows second-job holding--moonlighting. Only a very small fraction of the shift workers held second jobs (a total of eleven out of the 253); the proportion of day workers with second jobs was higher (four out of 59). It seems clear that a large part of the explanation for this lies in the fact that rotating shift work schedules are dominant in Pakistan so that any second job would also have to rotate. Only day workers typically follow the fixed schedule that would allow a worker to commit himself to additional regular work.

### C. The Effects of Shift Work

#### 1. Physiological Effects

A central question for the survey was whether there exist systematic physiological differences between workers doing regular day work and those working shifts. A secondary objective was to discover any such differences among the various shift-working patterns found in Pakistan--especially in relation to the speed or frequency of rotation--and, a tertiary one was to see if all workers, together, display regular patterns of physiological reaction to their work. We accept the position, implicit in the advanced country studies that the main problems, and hence the significant social costs, of shift-working revolve around workers' sleep, eating, and general health patterns.

a. Sleep

There is little doubt in examining Table 1 that differences in both quantity and quality of sleep between day workers and shift workers are large and significant in Pakistan.  $\chi^2$  value obtained is very high and significant at less than 1 percent level. In response to whether they experienced sleeping problems, more than four-fifths of the day workers reported no problems while less than one-fifth of the shift workers said they had no difficulty sleeping. The dominant problem was "not enough sleep" for both though "poor quality of sleep" was also significant. An overwhelming proportion of those who had trouble sleeping reported that heat was the primary source of their trouble. Noise and insects, the other two major explanations, were far less often cited. The importance of heat in affecting the workers' sleep patterns also shows up in their stated preferences for winter and summer work (not reported in Table 1); only 36 percent of the day workers expressed a preference for winter work while 67 percent of the shift workers did so. Among the workers on different types of shifts, the alternating day-night workers much more strongly preferred winter work than did those on any other patterns; these people spend half their time sleeping during the day while workers on all other shift patterns always have the option of sleeping during part of the night with its cooler temperatures. The tropical climate of many LDCs makes workers' sensitivity to heat a finding of particular importance.

Different shift work patterns also reveal systematic differences in the role of sleep problems,  $\chi^2$  value is significant at less than 1 percent level. The most difficult shifts are apparently those in which the worker rotates through the entire twenty-four hours either with three eight-hour

Physiological Effects of Shift-Working: Sleeping Problems and Causes

1. <u>Sleeping Problems</u>	Day workers	Shift workers	Shift Workers			
			3-shift Rotating <sup>a</sup>	Afternoon Day-night <sup>b</sup>	Double-day <sup>c</sup>	Other
Total	<u>59</u>	<u>253</u>	<u>211</u>	<u>30</u>	<u>6</u>	<u>6</u>
	(in percentages)*					
No problem	81.4	19.0	17.1	16.7	83.3	33.3
Poor quality sleep	10.2	60.5	60.2	73.3	16.7	33.3
Not enough sleep	8.5	21.7	22.7	10.0	--	50.0
	$\chi^2 = 88.128$		$\chi^2 = 30.424$			
	Significance level < .001		Significance level < .001			
<hr/>						
2. <u>Cause of sleeping problems</u>						
Total**	<u>11</u>	<u>205</u>	<u>175</u>	<u>25</u>	<u>1</u>	<u>4</u>
	(in percentages)*					
Heat	54.5	85.4	86.7	75.0	100.0	50.0
Noise	18.2	18.5	19.4	25.0	--	50.0
Insects	18.2	14.6	17.6	--	--	--
Not stated	9.1	6.8	5.7	12.0	--	25.0
	$\chi^2 = 12.418$		$\chi^2 = 6.449$			
	Significance level = .007		Significance level > .5			

\*Multiple answers were allowed so percentages may add to more than 100

\*\*Workers with sleeping problems

<sup>a</sup>Three eight-hour shifts

<sup>b</sup>Two twelve-hour shifts

<sup>c</sup>Two eight-hour shifts starting early morning

shifts or two alternating twelve-hour shifts. Fewer than 20 percent of the workers on these two patterns reported no problems with sleep. In contrast, the double-day shift (an early morning and a late afternoon shift) appears to generate few sleep problems. Though the sample is small, there is even a smaller percentage of sleep complaints among those workers than among day workers. The double-day shift appears to take the place of the fixed afternoon shift of advanced countries in making minimal demands on the workers. Again, the predominant reason for sleep problems appears to be heat during sleeping hours. There is no significant variation in causes of sleep problems by type of shift pattern.  $\chi^2$  value is insignificant. There were also no systematic differences reported among workers according to the frequency with which they changed shifts--a one-week rotation cycle appeared no more or less demanding than a two-week cycle (not shown in Table 1).

Unfortunately, the paucity of data on fixed non-day shift workers in this sample prevents us from sorting out the influence of change in schedule as separate from the influence of the conflicting schedule. Certainly the heavy emphasis on heat as a source of sleep problems implies that a work schedule in conflict with the "natural" (coolest) time for sleeping carries high cost, be it rotating or fixed. But this needs further substantiation.

b. Eating Problems

Table 2 shows the major results in response to questions about eating and appetite problems encountered in day and shift working and on the various shift work patterns. Certainly day workers are more satisfied with their routines for eating than are shift workers--by almost twice as much in this sample. Again,  $\chi^2$  is highly significant. It is less clear how to explain this greater satisfaction. Problems for both take the form of "less appetite."

Table 2

Physiological Effects of Shift-Working: Eating Problems

<u>Eating Problems</u>	Day workers	Shift workers	Shift Workers			
			3-shift Rotating	Afternoon Day-night	Double-day	Other
Total	<u>58</u>	<u>246</u>	<u>205</u>	<u>29</u>	<u>6</u>	<u>6</u>
	(in percentages)*					
No problems	69.0	35.8	36.1	37.9	33.3	16.7
Less appetite	15.5	36.6	36.6	31.0	33.3	66.7
Time adjustment	8.6	29.3	29.3	27.6	16.7	16.7
Poor quality food	8.6	6.9	7.3	3.4	16.7	--
	$\chi^2 = 26.61$		$\chi^2 = 8.008$			
	Significance level $<.001$		Significance level $>.5$			

\*Multiple answers were allowed so percentages may add to more than 100.



A number of shift workers saw the cause of their problem in the difficulty of adjusting meal hours, but so (inexplicably) did 9 percent of the day workers. It is important to note that poor quality food does not appear to be a major problem among shift workers--in percentage terms, it is even less their problem than it is the day workers', a fact explained in part by the larger proportion of shift workers who bring food from home (41 percent of the shift workers; 25 percent of the day workers). Among shift workers there are no clear and significant differences by shift patterns in eating problems. However, the frequency of shift rotation (not shown) does appear to influence workers' eating problems; those on one-week rotation schedule have a higher number of complaints about eating (66 percent) than have those on the slower two-week schedule (54 percent). This appears compatible with the hypothesis that sleep problems are often dominated by conflict with the worker's environment while eating problems are caused by change of schedule.

c. General Health

The questions in the survey pertaining to the worker's sense of his general health were inevitably vague, but short of an objective medical examination, this was the only feasible way even to suggest how workers feel--or how they feel they feel. The pattern that emerges from Table 3 is very similar to that of the earlier two problems--day workers feel that they are healthier than do shift workers.  $\chi^2$  is significant at less than 1 percent level. Among the shift working patterns, the double-day shift (still with caveats about size of the sample) appears to be the least demanding shift schedule. However,  $\chi^2$  value obtained is insignificant. In an attempt to get more precise information than perceived general health, the survey

Table 3

Physiological Effects of Shift-Working: Health Problems

<u>Health Problems</u>	Day workers	Shift workers	Shift Workers			
			3-shift Rotating	Afternoon Day-night	Double-day	Other
Total	<u>58</u>	<u>249</u>	<u>208</u>	<u>30</u>	<u>6</u>	<u>5</u>
	(in percentages)*					
No problems	53.4	23.3	24.5	16.7	33.3	--
Poor general health	22.4	49.8	49.0	50.0	33.3	100.0
Poor digestion	5.2	10.8	6.7	3.3	--	--
Headache/fever	6.9	6.4	5.3	13.3	16.7	--
Related to occupation	8.6	6.8	6.3	13.3	--	--
	$\chi^2 = 24.149$		$\chi^2 = 14.690$			
	Significance level < .001		Significance level = .475			

\*Multiple answers were allowed so percentages may add to more than 100.

included a list of complaints common to Sub-continent folk diagnoses--"fever," "headache and dizziness," etc.--but none of these showed interesting differences between groups of workers.

d. Worker Characteristics Contributing to Physiological Problems

Three closely related characteristics that affect shift work response are worker's age, years of industrial experience, and years of shift-working experience. It would be difficult and unnecessary with this sample to separate their individual influence since they are very highly correlated. Together they suggest a pattern of increasing physiological problems with increasing age and work experience. Though day workers show no relationship between physiological problems and age or experience, for shift workers older than 29, sleeping and eating and general health problems clearly increase. The effect is strongest for complaints about eating and sleeping and in all cases the older and more experienced worker suffers more physiological problems from shift-working than does the young one. This suggests that self-selection among industrial shift workers is less operative in LDCs than in advanced countries; industrial shift workers appear to age in their jobs, hanging on despite their increasing sense of physiological problems.

As in the advanced countries, education increases complaints. Better educated day workers did not complain perceptibly more about sleeping and eating, but better educated shift workers consistently did. Illiterate shift workers (those with no formal schooling) appeared quite docile with the fewest complaints about either sleeping or eating; those shift workers with more than nine years of schooling complained a good deal more about sleep patterns than did those with less schooling.

The home environment of a worker has considerable influence on the ease with which he does his job and this could well be exacerbated in a poor

country where the average living arrangements for industrial workers are less elaborate than in advanced countries. So the questionnaire collected information on marital status, the number of dependents in a worker's household, and the total number of people living in the household. The results were interesting and in part unexpected.

Being married appears to have a negative effect on the worker's perception of physical well being. Married day workers had more problems with sleep than did single workers (25 percent versus 12 percent). Corresponding figures for shift workers are 88 percent and 65 percent. While there were no differences in eating problems between married and single day workers, married shift workers again reported more eating problems than did single shift workers (50 percent versus 72 percent). It may well be an anomaly, but looking at the nature of these eating complaints among shift workers, married workers complained more about loss of appetite (married 19 percent; single 8 percent) while single workers complained more about difficulties of adjustment (3 percent among married workers; 12 percent among single). Married workers reported more problems with general health on both day (married, 52 percent; single, 40 percent) and shift working (married 81 percent; single 66 percent).

The number of dependents in the shift worker's household is strongly related to his physiological problems in a way that is, on reflection, quite predictable. One dependent (typically a wife), does not create problems, but two or more (children) do. Among shift workers living with no more than one dependent, 37 percent reported no sleep problems but among workers with two or more dependents, all but 12 percent had problems sleeping. Though there was no such pattern in eating problems, it appeared strongly in the workers' view of their general health. For shift workers living with no more than one

dependent, 38 percent reported no health problems while only 18 percent of the workers with two or more dependents reported no such problems. General health for day workers also appears to be affected; more of those living with two or more dependents reported health complaints than did those with one dependent (67 percent versus 19 percent). It seems clear that the presence of dependent children create problems for the shift worker that the presence of a wife does not.

In light of these quite clear patterns showing the influence of being married and of the number of dependents in the household, it is surprising that the number of other people, per se, living in the household shows very little relationship with physiological problems despite the impressive range of observations (from zero to eleven and more). The single exception to a complete absence of pattern is that among shift workers' general health appears somewhat worse for those living with three or more other people (34 percent reported no problems among those living with zero to two; 19 percent among those living with three or more). We suspect that with a sample large enough for multiple regression analysis, this curious result might well be explained by the concentration of young workers without dependents in large collective households.

e. Summary

The physiological data of this survey appear to describe a group of industrial shift workers who report problems that are quite consistently and negatively affected by the shift-working. Compared with day work, shift-working is associated with greater difficulty of sleeping and eating and in the perception of general health. This is in sharp contrast with the picture emerging in advanced countries where the more that is known, the less is the

concern with these physiological effects of shift work. We will return to the important implications of this result in Part III.

## 2. Convenience and Attitudes

Both empirical studies and speculation on the effects of shift-working have stressed its inconveniences as important in shaping workers' preferences--that working at unusual times creates conflicts with the supply of services in the form of transportation and food and, especially for poor LDCs, that an unsophisticated population might resist shift-working because of fears of banditry, the dark, or other perils of the night. So the questionnaire tested these propositions.

Transportation to and from work is often thought to create special problems for the shift worker in an LDC but the results of this survey did not confirm this impression. As would be expected, a greater proportion of day workers rode the bus to work (20 percent versus 10 percent) and more shift workers walked (81 percent versus 68 percent) but the dominance of walking was clear in both cases. Day workers paid a bit more, on the average, to get to work (88 paisa versus 78). This is consistent with their greater use of commercial buses. The average amount of time devoted to commuting was virtually the same for day and shift workers (half hour each way).

An interesting fact for those who envision a timid and primitive industrial worker in an LDC is that, when asked about safety problems in getting to work, most reported no problems (over 90 percent for day and shift workers) and the major safety problem cited was "traffic hazards"--about five percent of both day and shift workers saw that as the sole problem of getting to work. "Dacoits" (bandits) worried seven of the shift workers

(3 percent) and none of the day workers. Fear of the dark was a problem for only one day worker and one shift worker. Finally, and again not surprisingly, those working a twelve-hour shift complained more about travel safety problems than did those working shorter shifts.

Meal arrangements at work appeared to be equally satisfactory or unsatisfactory for both day and shift workers. Canteen and home food were the primary sources with home food being more important to shift workers. Shift workers were given (or took) less average time for meals (25 minutes as against 35 minutes for day workers); the cost of meals was about the same for both.

When asked about problems specifically related to or derived from their work schedules, a remarkably small number of workers on either days or shifts admitted to having any. Among day workers, 85 percent had no complaints; among shift workers 91 percent. It is possible that given the evidence of correlation between work schedule and the problems reported above, workers tended not to perceive their work schedule as directly the source of their problems. This is not consistent, however, with their stated preferences discussed below. Specific questions about more strict supervision, finding transportation, and family problems, all failed to elicit any significant response from shift or day workers. It is possible that these questions were not well understood by the enumerators; otherwise the response remains something of a mystery.

### 3. Preferences

While a simple statement about which shift is "best liked" leaves a number of unanswered questions (the most important being Why), a number of interesting and suggestive opinions emerged in response to that question.

The most powerful was, expectedly, that most workers prefer to work days--98 percent of the day workers and 91 percent of the shift workers. This predominant appeal of a "normal" work schedule is the same as that found in advanced countries. But, again as in advanced countries, there is evidence that workers tend to support their own status quo--of the 24 people who did not prefer day work, 23 were working shifts at the time of the interview. Among shift work patterns, the appeal of day work appears inversely correlated with the physiological demands of the shift pattern. Among those working the demanding alternating day-night schedule, 100 percent would prefer steady day work; of the three-shift workers, 90 percent would prefer days; and of the double-day shift workers, 83 percent would prefer days.

The reasons given for preferring the day shift were systematic and related to responses to the earlier questions: over 70 percent of both day and shift workers said that "sleeping well" was the reason for their preference; "family responsibility" was cited by 35 percent of the day workers and by 22 percent of the shift workers and "better health" by 8 percent of the day workers and by 18 percent of the shift workers. Religion (.8 percent of the shift workers), children (none), social life (5 percent of day workers; 4 percent of shift workers), leisure (10 percent of day workers; 5 percent of shift workers) and to further education (5 percent of day workers; 2 percent of shift workers) were minor explanations. No workers responded that "higher wages" were a motive for their shift preference reflecting the general absence of a shift wage premium (and the ambiguity of such a payment for rotating shift workers) in Pakistan.

Finally, in response to the question of why they actually worked a disliked shift in contradiction to their preferences, 96 percent of the shift workers replied that it was "necessary" since shift work represented their



only employment opportunity. While this effect of widespread unemployment has previously been hypothesized [8], it is reassuring to see it so soundly confirmed.

#### 4. Unemployed Workers

It was noted earlier that all of the existing studies of advanced country attitudes toward shift-working deal with employed workers with the implicit comparison being between working days and working shifts. In LDCs with widespread unemployment, the relevant choice may often be between working shifts and not working at all. Therefore our survey included fifty-one unemployed workers. We gathered information on their characteristics (as in the case of the employed), on their preferences for work schedule, and on their willingness to work at non-preferred times. It was thought irrelevant (in retrospect, mistakenly) to ask them those questions about physiological well-being that were asked of the employed workers.

Unemployed workers were different from the employed--both day and shift workers--in a number of respects. They were younger; 73 percent of the unemployed were under thirty compared to 51 percent of the employed workers. A significantly larger proportion of the unemployed were single; 65 percent as against 34 percent of the employed workers. The unemployed workers appeared to be slightly better educated than the employed. Finally, only 30 percent of the unemployed workers had more than ten years of industrial work experience as against 48 percent of the employed workers.

The picture that emerged from this small sample is consistent with the view that the unemployed in LDCs are often those better "able to afford" unemployment--they are younger and are less likely to be the sole support of a family [2]. Unemployment is a luxury denied to the very very poor.

Most of the unemployed had been without jobs for less than six months (63 percent of them); almost a third, however, had been unemployed for two years or more.

But the purpose of including the unemployed in the sample was to test their work time preferences. On this they were very clear. As in the case of the employed, unemployed workers strongly preferred to work during the day--of the 49 who stated a preference, 45 preferred to work days (three preferred afternoon shift and one preferred night shift). Their reasons for this preference again paralleled those of the employed with many citing "good sleep" as the major reason (45 percent). "Better health" (25 percent), "family responsibilities" (18 percent), and "to pursue education" (20 percent) were also cited.

The most important question addressed to the unemployed--in the context of high levels of unemployment in an LDC--was whether, given their preference for working days, they would be willing to work on a non-preferred shift if a job were available at that time. Their response was clear and expected: 85 percent said that they would. Their reason for violating their preferences was, uniformly, "to have employment" (100 percent). Of the seven (15 percent) who said they would be unwilling, health was cited as the reason by four, education by one and the other three failed to be explicit.

So evidence from both sources is consistent. Employed workers who were working on schedules they profess to dislike said that their reason for doing so was that that was the only job available; unemployed workers who profess to dislike shift-working would none-the-less take a job on that schedule if it were available. These are not surprising results, but they are of considerable importance.

### III. Conclusions and Policy Implications

The most striking result of this study of workers in a less developed country is the contradiction between these findings and those from advanced countries. In advanced countries, there is little concrete evidence that shift-working harms workers. In Pakistan, it does. So the major questions are "Why such different results?" and "What do they imply for development policies?"

#### A. Self-Selection of Shift Workers

The explanation for such sharp differences appears to rest on the way the process of self-selection operates--or fails to--among shift and day workers in advanced and less developed countries. Studies of workers in advanced countries have often warned against drawing too glib conclusions from the absence of personal costs of shift-working since the population of shift workers studied was the result of a long process of self-selection. Those individuals who would have the greatest difficulty either with time conflict or in making repeated adjustments of work/leisure rhythms are simply not often found among shift workers--they would long since have taken jobs during the day, eliminating their need to conflict or adjust [1, 3, 9]. In addition, the premium wage offered in shift-working positively rewards those who stay and at the same time attracts those who find shift-working undemanding [3]. Together, these forces act to distill out of the working population those who most easily work shifts and to assign them to that work schedule. The process takes time, of course, so in advanced countries, the older workers are those who have the least trouble with shift-working. Thus, advanced countries studies have told us something about how shift workers do adjust, but very little about how most people would respond to the demands of shift work.

The process of self-selection is undoubtedly influenced by conditions of industrial employment. This provides explanation for such marked differences between advanced and less developed countries. In advanced countries with generally low levels of unemployment, a worker leaves shift-working when he finds that he does not adjust easily to its demands. Those who remain in shift-working do so because they are not much affected by change in or conflict of work patterns. The critical ingredient in this self-selection process is the availability of jobs--both the shift worker and the day worker who want to change their work schedules know they can do so with minimal risk of unemployment because of a generally strong demand for workers.

In LDCs with high levels of unemployment, the pattern of self-selection is absent. Assuming the same distribution among workers of propensities for and against shift-working, the workers in an LDC will be much less able to sort themselves out because of barriers to their mobility in both directions--from shift work to day work and vice versa. The existence of high unemployment substantially increases the risk involved in quitting a shift job to take a day job for the shift worker who finds the demands of his schedule costly. Also, the existence of widespread unemployment eliminates workers' bargaining power to embody their preferences in a shift wage premium. And so the day worker who might find shift-working perfectly acceptable, even if not desirable, has no incentive to seek it. Movement in both directions is blocked by unemployment. In this situation, as we have seen, older shift workers have the most trouble with shift-working.

While these propositions about self-selection of shift workers are untested both in advanced and less developed countries--and must remain so until a cohort group is followed through a number of years of shift work

experience--they strongly suggest that increased employment opportunities will reduce the social costs of shift-working by increasing self-selection.

There is an important corollary to the relationship between employment, self-selection, and the social costs of shift-working. Advanced country investigations have not only failed to show much effect of shift-working on worker health and adjustment, but they have also found no evidence of lower worker productivity on night shifts. Experimentally, task performance suffers with drop in body temperature late at night, but in practice no pattern of lower night productivity has been found [3, 6a]. It seems clear that the absence of productivity effects and the absence of discernable physiological costs of shift work are two sides of the same coin; among workers who do well under the regime of shift work, successful adjustment shows up both in their relative absence of physiological complaints and in their ability to maintain high productivity.

The broad implication for development policies is obvious--it would be very dangerous to assume that the evidence of constant day-night productivity in advanced countries is applicable to LDCs. Bearing in mind that there is no concrete evidence--either way--about night-time productivity in LDCs it is likely to be lower since LDC workers are clearly affected by their shift work schedule. The causality appears to be: (a) high levels of unemployment both (b) create a high risk in worker self-selection between shift and day work and (c) eliminate the premium wage for shift-working, and these (d) discourage self-selection in both directions (e) leaving a large proportion of ill-adapted individuals working shifts, (f) suffering physiologically, and (g) producing with lower productivity.

B. Development Policies

This pattern suggests a Myrdal sort of "vicious circle" in low levels of employment in LDCs: the higher cost to the producer using night-time labor because of lower night time efficiency discourages increased utilization of capital and therefore reduces the level of employment with a given capital stock, which in turn discourages self-selection of workers, thus assuring continued low productivity.

This suggests a tempting but dubious policy of raising the shift wage premium by legislation--demanding that producers pay workers on shifts a premium wage which will overcome at least part of the problem of self-selection by offering positive inducement to adaptable day workers to switch to shift work. But aside from the practical difficulties of this approach (not the least of which is determination of what is a premium shift wage when all workers rotate shifts), there are more serious problems in the disincentive effects this would create and even the doubt that the policy taken in isolation would increase self-selection. An increase in the night-time wage differential would, ceteris paribus, tend to reduce utilization of the capital stock and employment [10]. Of course, the intent of an increased shift differential would be that the net effect would not raise the effective night-time wage rate paid by producers--that the higher explicit wage premium would induce more self-selection which would increase night-time labor productivity enough to offset the increased shift wage. But it is very difficult to be confident that an imposed night wage differential, in the presence of still-high unemployment, could have enough effect on night-time productivity to offset the increase in wage rate. Even if it did eventually, the evidence suggests that the self-selection takes time and in the interim the producer

would face both low productivity and higher wage rates at night; a combination certain to reduce utilization and employment.

A far more promising approach to increased self-selection--though less specific and less novel--is increased general levels of employment. A reduction in unemployment operates on both sides of the self-selection process--the risk of leaving shift work is reduced for those not adaptable to it and the reward of entering shift work is increased for those who can adapt. What is more, a major aspect of any successful employment-creation policy will almost certainly be "getting prices right" by increasing the price of scarce capital relative to abundant labor [2, 6]. This will tend to increase utilization, increasing the opportunities for shift work at the same time as creating the incentives to undertake it.

It appears, therefore, that the major explanation for the striking difference between advanced country and LDC workers in their ability to work on a shift work schedule is the difference in the self-selection of shift workers and that, in turn, this is the result of differences in the levels of employment. Thus a reduction in the social costs of shift-working appears to be an additional benefit that would accrue from higher employment levels.

APPENDIX

Description of the Sample Survey of Industrial Workers

The sample survey on which the study is based consists of 363 industrial workers (including skilled, semi-skilled, and unskilled workers) interviewed in Karachi and Lyallpur--the two largest industrial cities in Pakistan.<sup>1</sup> Each respondent was interviewed in his own residence and not on the factory premises. The advantages of residence-location versus job-location interviewing are availability of unemployed workers, a more relaxed environment, and especially absence of employer coercion and hence a greater probability of obtaining unbiased responses. Also the respondent was not required to report his name and the name of the establishment for which he worked in order to assure him of the confidentiality of his answers. This is very important in a society with high unemployment and where continuing employment depends solely on the discretion of the employer.

The survey was carried out in the three large labor residential areas of Karachi (namely, Landhi, Baldia, and Hasart Mohani Colony) during April 1971 and in three in Lyallpur (namely, Islampura, the area containing adjacent small localities of Old Central Jail and Purani Jhuggi, and the area containing adjacent small localities of Hajiabad, Siddigabad, Jamilabad, and Nishtabad) during May 1971. Sixty-nine percent of the total employed workers surveyed in Karachi and 93.5 percent in Lyallpur are shift workers (Appendix Table).

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<sup>1</sup>Most of the respondents in Karachi worked in large industrial complexes. In the case of Lyallpur the sample areas contained numerous small-scale family owned cotton manufacturing enterprises. These small establishments were found to be very similar to the industrial giants in terms of manufacturing system, machinery, and shift system. To exclude workers of these industries from the sample would have obviously created a sampling bias. These workers constitute less than one-third of the total sample in Lyallpur.



The inclusion of general shift or day workers in the sample, though small in number, provides important control variables for identifying the problems and preferences associated with shift work. A small-scale pilot survey was undertaken in Shevshah Colony, part of S.I.T.E. area, in Karachi in March 1971 for pre-testing the questionnaire.

No satisfactory sampling frame existed in terms of listing of industrial workers and households or mapping of household dwellings in the above mentioned sample areas. Given the inhibiting cost (time, personnel, and finances) of preparing an appropriate sampling frame, a simpler cluster sampling design was used, as explained below.

Each area was divided into different localities or subsections either along the lines of mohallas' boundaries (a mohalla is a homogeneous cluster of four to eight city-blocks) or, where available, by using the administrative geographic breakdown of the area as adopted by the union council--the local government body (with each subsection electing one member to the council according to representation by population). Selection of sample subsections was made completely at random. The number of sample localities depended on the size of the residence area; the aim was to have approximately one percent of the total number of households in an area in the sample. In each sample cluster an attempt was made to enumerate one worker from each tenth household dwelling. An extra element of randomness was introduced by visiting the sample cluster at three different times of the day (before noon, afternoon, and evening) and on different weekdays and weekends. This also broadened the cross-classification of workers included in the survey by their work and shift patterns.

Workers were interviewed in their native languages. Given the low literacy level among the workers, extra emphasis was laid upon the worker's full understanding of the question and on his not giving a hurried and biased answer. On the average, more than one-half hour was spent on an interview. We believe that these efforts of obtaining a relatively error free survey and unbiased responses more than compensate for the small number of workers interviewed. It is also worth mentioning that this sample survey was not a representative sample. The primary objective was rather to obtain a satisfactory cross section of workers in terms of the nature of industrial work and work pattern as well as the type of industry establishment and ethnic background (this is also a reason for covering more than one worker residence area). The composition of the sample by type of worker and shift is given in the Appendix Table.

APPENDIX TABLE

Respondents by Type of Work Pattern,

Karachi and Lyallpur

Type of worker	Total		Karachi		Lyallpur	
	Number	Percent	Number	Percent	Number	Percent
<u>Shift workers</u>	<u>253</u>	<u>81.1</u>	<u>109</u>	<u>69.0</u>	<u>144</u>	<u>93.5</u>
Three-shifts (8-hours)	211	67.6	92	58.2	119	77.3
Alternating day/night (12-hours)	30	9.6	9	5.7	21	13.6
Double day: morning/ afternoon (8-hours)	6	1.9	4	2.5	2	1.3
Afternoon/night (8-hours)	1	0.3	1	0.6	--	--
Other	5	1.6	3	1.9	2	1.3
<u>General or Day Workers</u>	<u>59</u>	<u>18.9</u>	<u>49</u>	<u>31.0</u>	<u>10</u>	<u>6.5</u>
<u>Total Employed Workers</u>	<u>312</u>	<u>100.0</u>	<u>158</u>	<u>100.0</u>	<u>154</u>	<u>100.0</u>
<u>Unemployed Workers</u>	51		40		11	
Total	363		198		165	

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