OBSERVATIONS ON THE NUTRITIONAL STATE OF LOW-PAID AFRICAN LABOURERS IN NATAL

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In South Africa, as elsewhere, the problem of the nutrition and health of workers is at present arousing much interest. 'The modern approach to the problems of industrial health more and more tends to involve positive programs of health promotion... There are thousands of employees who are operating with low efficiency as a result of... inadequate dietaries'.[1]

This report deals with a study of the nutritional state and diet of 6 groups of low-paid African male labourers in or near Durban. The investigation was conducted during May 1960 at the request of 6 companies concerned about the diet, health, and efficiency of their workers. These companies were: company A, a whaling industry; B, a sugar-planting and milling company; C, a factory handling bulk raw materials; D, a foundry and engineering factory; E, a food factory; and F, a manufacturing industry.

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SUBJECTS AND METHODS

At each firm 40 labourers were selected for study at random from those in the 20 - 39 years age group. The selected men were on the lowest grade of pay, and employed for at least 6 months (4 months at company B). A few workers with occupational and possible dietary privileges, e.g. cooks, and also men under treatment for tuberculosis, were excluded.

The mean age of the men studied was 28·6 years. In each group 80% or more of the men were Zulu, except at company B where 68% were Pondo. Over half (62%) of the men had had no schooling, and only 18% had had over 4 years at school. Almost all (97%) of the men had spent the greatest part of their childhood years in a rural area. In each group, between 62 - 70% of the men were married. They were essentially migrant labourers. Only 6% of the married men, and 1% of the unmarried, were living with their families. Many of the men had spent long periods in town, except those at company B, of whom 98% had never lived in a town. Of those at the other companies, 90% had spent at least 5 years in a town, and 56% at least 10 years. Except at company B, where most workers are employed on contract for periods of 6 months, most of the men selected for study were in fairly stable employment; at the other firms they had been in their present job, on an average, for 4·6 years (median figure) exclusive of breaks. All the men were engaged in manual work, which was possibly least strenuous at companies E and F. The men's mean cash wages, according to their own statements, were £2 12s. per week, ranging from £1 1s. to £3 13s. at different companies.

Each man was questioned by a health educator trained in interview technique, and was subjected to a clinical nutritional assessment. Detailed observations were confined to selected signs which are frequently found in malnourished groups. These signs, together with explanatory notes, are listed in Table I. Fuller details of the methods used will be found elsewhere.[2] Scores were used to express the grade of 3 skin abnormalities, viz. phrynoderma, dyssebacea/folliculosis and skin xerosis. These scores were arrived at by recording the intensity of each sign (1 = mild, 2 = moderate, and 3 = marked) in a number of selected skin areas,[2] and then adding the corresponding figures for the various skin signs. The total was used as a measure of the grade of each abnormality. The 'skin xerosis' score was based on the total scores for the following signs: dryness, dullness, increased reticulation, flaking and hyperkeratosis. This score was thus an index of skin dryness and dullness, and the commonly associated textural abnormalities. Each man was examined simultaneously by both the authors, who reached agreement on each finding. Blood was collected for estimations of serum protein (Weichselbaum's method[3]); unfortunately, fractionations were not possible.

The chi-square test, with Yates' correction, was used to assess the statistical significance of the findings. The 5% level of probability was used.

FINDINGS

Signs of malnutrition were found in all the men examined. There was a high prevalence of leanness, of skin and mucosal lesions, and of low total serum-protein concentrations (Table I). No cases of pellagra or other flagrant nutritional diseases were found. Few such cases, however, are to be expected in a group of active employed men.

The findings were compared with those among a population sample of African men living in a Durban housing scheme, studied in 1958. Most (84%) of the men in this sample were in social classes IV or V[4] (predominantly unskilled or semi-skilled labourers). The findings in the 2 groups were in many respects similar. However, leanness, gingivitis and dyssebacea/folliculosis were more common than in the population sample, and follicular enlargement and fissuring of the tongue less common (Table I).

The men's responses to a series of questions concerning the frequency with which they usually took a number of selected foodstuffs indicated that their diet was, in general, unsatisfactory, with particular regard to animal tissues, milk, yellow or green vegetables, and fruit. The average number of days a week on which the following foods were taken (median figures) were: meat, 3; fish and eggs, 0; milk as a beverage or with porridge, 0; *amasi* (sour milk), 0; green or yellow vegetables, 2; fruit, 0; brown or wholewheat bread, 3; and white bread, 0.

The prevalence of some signs of malnutrition showed a wide variation at the 6 companies studied.

Company A

Although there was evidence of malnutrition in this group, the prevalence of the various signs tended to be lower than in the other groups, significantly so in many instances (Table I).

These men were housed in a compound, and fully fed by the company. An analysis of their rations in March 1960 had revealed a number of shortcomings, which the company had attempted to rectify during April 1960 (the month preceding the present study), mainly by adding brown bread and *tshwala* (kaffir beer), and by increasing the allotment of meat and beans (Table II). In addition, pending further improvement in the rations, a daily vitamin pill was provided. The rations at the time of the present study were still deficient in calcium. The figures presented in Table II are an underestimate of the true value of the men's diet, since the men are liberally supplied with whale-meat (amount unknown), over and above their rations, during the whaling season (approximately May - September). As most of the men studied had been employed for some years (90% for more than 1 year, and 62% for more than 2), it was considered that their relatively good nutritional state could be ascribed partly to the cumulative effect of their liberal provision of whale-meat, and partly to the recent improvements in their general diet.

Company B

The men in this group, who were also housed in a compound and provided with their full diet, were in a worse nutritional state than those at company A. There was among them a significantly greater prevalence of low relative weights, angular stomatitis, skin xerosis, phrynoderma, dyssebacea/folliculosis, and low total serum-protein concentrations. Tongue lesions and pyorrhoea were less prevalent than among men at companies C - F.

An analysis of the rations provided at this plantation in 1958 had revealed gross shortcomings in the diet (Table II). A high state of malnutrition had been found in a

TABLE I. PREVALENCE % OF SIGNS OF MALNUTRITION AMONG LABOURERS, WITH COMPARATIVE FIGURES FOR RESIDENTS IN AN URBAN HOUSING SCHEME

	Labourers (combined)	*Durban housing scheme**	*Company A*	*Company B*	*Company C***	*Company D*	*Company E*	*Company F*	*Explanatory notes*
Number of labourers ..	240	65	40	40	40	40	40	40	
Leanness	30·9	7·7†	22·5	42·5	40·0	25·0	22·5	32·5	Arm skinfold thickness of under 5·0 mm. Measured half-way down the back of the right arm, over the triceps, with a Harpenden caliper.[4]
Underweight	17·5	12·3	*0*^{BCDEF}	**22·5**^{A}	**20·0**^{A}	**15·0**^{A}	**15·0**^{A}	**32·5**^{A}	Weight at least 10% below the standard weight of a US male of the same age and height.[5]
Overweight	17·1	24·6	25·0	12·5	30·0	12·5	10·0	12·5	Weight at least 10% above the standard weight of a US male of the same age and height.[5]
Lip signs									
Lip dryness	61·3	58·5	*42·5*^{C}	67·5	**82·5**^{ADEF}	*62·5*^{C}	*52·5*^{C}	*60·0*^{C}	Any degree of dryness of the whole of the lips or at angles.
Angular stomatitis ..	9·2	8·3	*0*^{B}	**22·5**^{AC}	*0*^{B}	10·0	10·0	12·5	Sodden or cracked angles. Over 5% is regarded as abnormal.[5]
Gum signs									
Gingivitis	63·3	40·0†	65·0	65·0	77·5	55·0	65·0	55·0	Any degree of softness and swelling or redness, with or without pus.
Pyorrhoea	46·2	52·3	*25·0*^{CDE}	*27·5*^{CDE}	**70·0**^{ABF}	55·0^{AB}	55·0^{AB}	*45·0*^{C}	Pus obvious, or appearing when gums are pressed lightly.
Bleeding	7·1	6·2	7·5	**17·5**^{EF}	2·5	**15·0**^{EF}	*0*^{BD}	*0*^{BD}	Bleeding, spontaneously or on light pressure.
Tongue signs									
Papillary changes ..	81·2	—	*65·0*^{CDEF}	*65·0*^{CDEF}	**90·0**^{AB}	**87·5**^{AB}	**92·5**^{AB}	**87·5**^{AB}	Papillary atrophy and/or hypertrophy/hyperaemia, of any degree. Usually at the tip and sides. 'Geographism' excluded. As atrophy and hypertrophy/hyperaemia may under certain conditions be manifestations of the same pathology, their combined prevalence is given, as well as the separate prevalence of each (see below).
Ditto (moderate or marked)	12·5	—	7·5	*2·5*^{CD}	**20·0**^{B}	**20·0**^{B}	15·0	10·0	Excluding papillary atrophy at the tip and sides only, or slight hypertrophy or hyperaemia.
Papillary atrophy ..	55·0	—	*35·0*^{CD}	*47·5*^{C}	**77·5**^{ABD}	*50·0*^{C}	65·0^{A}	57·5	Of any degree. Usually at the tip and sides. 'Geographism' excluded.
Ditto (moderate or marked)	3·8	—	0	2·5	2·5	5·0	10·0	2·5	Excluding signs at the tip and sides only.
Papillary hypertrophy or hyperaemia ..	58·8	—	*52·5*^{D}	*37·5*^{DF}	*52·5*^{D}	**77·5**^{ABC}	62·5	**70·0**^{B}	Of any degree.
Fissuring	66·2	80·0†	62·5	60·0	*50·0*^{DE}	**80·0**^{C}	**77·5**^{C}	67·5	Of any degree.
Magenta	6·2	0	5·0	*0*^{C}	**15·0**^{B}	2·5	7·5	10·0	Over 0% is regarded as abnormal.

Indentations	92·5	100·0	100·0	97·5	87·5	100·0	95·0	100·0	Tooth impressions visible at sides or tip.
Skin signs									
Xerosis	79·2	81·3	*35·0*^{BCDEF}	**85·0**^{A}	**87·5**^{A}	**90·0**^{A}	**90·0**^{A}	**87·5**^{A}	Score based on degree and extent of dryness, dullness, increased reticulation and flaking on face, trunk, shoulders and arms, and thighs.[2] Men with scores of under 9 (i.e. mild or localized signs) are excluded.
Xerosis (marked) (thighs)	17·9	—	*0*^{BCEF}	**22·5**^{A}	**35·0**^{AD}	*10·0*^{C}	**15·0**^{A}	**25·0**^{A}	Marked signs on thighs (score of 8 or more for this skin area). Separate figures provided for thighs, which are relatively protected from occupational trauma.
Phrynoderma	38·3	32·8	*7·5*^{BDEF}	**72·5**^{ACDE}	*17·5*^{BEF}	35·0^{AB}	**57·5**^{AC}	40·0^{ABC}	Score based on degree and extent of follicular keratosis[6] on trunk, shoulders and arms and thighs, excluding elbow, knee and trochanteric regions, and sternal and interscapular areas. Score based on degree and extent of lesion.[2] Men with scores of under 2 (i.e. mild localized signs) are excluded.
Ditto (moderate or marked) (thighs)	28·8	—	*7·5*^{BE}	**65·0**^{ACDEF}	*17·5*^{B}	*20·0*^{B}	37·5^{AB}	*25·0*^{B}	Men with scores of 2 or more for this skin area. Excluding knee and trochanteric regions.
Follicular enlargement	27·9	50·0†	25·0	25·0	*17·5*^{E}	25·0	**45·0**^{C}	30·0	'Permanent gooseflesh'[6] of any degree in areas listed above, under 'phrynoderma'.
Dyssebacea/folliculosis (moderate or marked)	41·7	26·6†	**42·5**^{C}	**60·0**^{CF}	*12·5*^{ABDEF}	**47·5**^{C}	**52·5**^{C}	35·0^{BC}	Follicles enlarged or plugged with sebum, on face, sternal or interscapular areas. Score based on degree and extent of lesion.[2] Men with scores of under 4 are excluded.
Mosaic (legs)	71·2	—	57·5	60·0	75·0	75·0	80·0	80·0	'Crackled skin'.[6] Mild lesions are excluded.
Oedema	1·7	3·1	2·5	2·5	0	2·5	2·5	0	Definite pitting on pressure over both ankles. Over 0% is regarded as abnormal.[5]
Low total serum proteins (below 7·5 g.%)	39·2 (227)	—	*5·1*^{BDEF} (39)	23·7^{ADF} (38)	*22·5*^{DF} (40)	60·5^{ABCEF} (38)	32·4^{ADF} (37)	**97·1**^{ABCDE} (35)	Although there is no clarity on the precise significance of total serum-protein values, there is evidence of a relationship between malnutrition and low values among Durban Africans.[7,8] The figures in parenthesis indicate the number of subjects.

Where there are significant differences in the prevalence of a sign at different companies, the significantly higher figures are printed in bold type, and the significantly lower figures in italics. Significant differences are indicated by superior letters, e.g. A = Significantly different from the figure for company A, B = Significantly different from the figure for company B.

* Figures for men aged 20 - 39, derived from a study of a population sample of adults living in a Durban housing scheme.[2,9,10]

** Many of the men were covered with dust which was difficult to remove completely, and obscured the skin signs. The figures for skin xerosis may be unduly high, and those for follicular lesions unduly low.

† Significantly different from the figure for the combined group of labourers.

TABLE II. ANALYSIS OF DAILY RATIONS OF MEN AT COMPANIES A AND B

	Company A		*Company B*		*Recommended standards†*	
	Before April 1960	*From mid-April 1960**	*February 1958*[12]	*April 1960***	*Moderately active*	*Heavy work*
Calories	1,937	3,887	4,876	6,081	3,000	4,500
Calories derived from maize (% of total calories)	62·7	58·4	76	70		
Protein (g.)	62·6	124	142·6	166·8	65	65
Animal protein (g.)	14·4	26·7	24·2	24·5	22	22
Calcium (mg.)	232	391	400	429	700	700
Iron (mg.)	19·7	34·5	43·8	53·3	9	9
Thiamine (mg.)	1·3	2·8	1·7	5·1	1·0	1·6
Riboflavin (mg.)	0·6	1·3	1·2	2·3	1·6	1·6
Nicotinic acid (mg.)	11·1	16·8	20·6	25·7	15	18
Ascorbic acid (mg.)	33·0	34·9	9·4	34·2	40	40
Vitamin A (i.u.)	647	649	74·6	1,330	4,000	4,000

Calculations based on Fox and Golberg's tables.[13] Where foods were not listed in these tables, other sources were used.[14-16]

* In addition to these rations, each man is supplied daily with a vitamin pill containing 2 mg. of thiamine, 3 mg. of riboflavin, 20 mg. of nicotinic acid, 75 mg. of ascorbic acid, 5,000 i.u. of vitamin A, and 400 i.u. of vitamin D.

** In view of the high caloric value, it is unlikely that most workers consume all of their rations. It is probable, however, that there is relatively little wastage of the more nutritious ingredients such as meat, fish, pulse and other vegetables.

† Recommended minimum daily dietary standards for men of average weight 160 lb.[17] These recommendations do not allow for vitamin losses during cooking; such losses may be considerable if food is overcooked.

sample of the workers at that time, and there was evidence that the men's nutritional state tended to deteriorate during their employment.[12] Since then the rations had been considerably improved, mainly by adding fish and providing more vegetables. The rations at the time of the present study were, however, still deficient in calcium, vitamin A, and (if cooking losses were considered) ascorbic acid, and contained an unduly high proportion of maize (Table II).

Even so, the nutritional state of the men examined was considerably better than that of the comparable group examined in February 1958, except in respect of dyssebacea and folliculosis which are signs of doubtful significance (Table III). It is considered unlikely that differences of the degree and range noted can be ascribed solely to seasonal factors, and it is believed that they probably reflect the improvements made in the rations.

TABLE III. PREVALENCE OF SIGNS OF MALNUTRITION AT COMPANY B IN 1958 AND IN 1960

Sign of malnutrition	*Prevalence %*	
	*February 1958 (36 men)**	*May 1960 (40 men)*
1. Leanness (arm skinfold thickness under 5 mm.)	61·1	42·5
2. Underweight (relative weight under 90%)	72·2	57·5
3. Lip abnormalities† (other than minimal abnormalities)	88·9	27·5**
4. Gum abnormalities† (other than minimal abnormalities)	72·2	35·0**
5. Tongue abnormalities† (other than minimal or mild abnormalities)	52·8	2·5**
6. Skin xerosis, trunk (marked xerosis only)	75·0	17·5**
7. Phrynoderma, trunk	2·8	2·5
8. Follicular enlargement, trunk	30·6	10·0
9. Dyssebacea/folliculosis (moderate or marked abnormalities only)	8·3	60·0**

These figures relate to men aged 20 - 39 and employed for at least 4 months.

* Figures derived from a study by Abramson, Slome and Ward.[12]

** Statistically significant difference.

† Ratings based on the nature degree and extent of the signs found.[12]

Companies C - F

These 4 companies are grouped together, since there were only minor or inconsistent differences between the nutritional findings in each case. At each company, the men showed more signs of malnutrition than at company A.

The men at company C were housed in a compound, and for 5d. were provided with a midday meal, which cost about 1s. 6d. to prepare. The majority of the men were, however, dissatisfied with this meal, and did not think it worth the price. Only 35% took it regularly. At company D, the men were housed in a compound but not provided with food. Before a dispute with the management in the middle of 1959, they had been fully fed by the company. Currently, they received an extra 3s. a week in lieu of food. Their food purchases amounted, on average, to 20s. 6d. a week, according to their statements. This was possibly an overestimate. The men at company E were not housed at work. Most (68%) lived in hostels, 16% with their families, and most of the others in rented rooms. They were provided with a free vegetable soup at midday. Many were, however, dissatisfied with this soup, and did not take it at all. The men at each of these 3 firms (C, D and E) consumed meat, on average (median figures) on 2 days a week, milk (as a beverage or with porridge) on 0 or 0·5, green or yellow vegetables on 0 or 1, and fruit, fish, eggs, and *amasi* on 0.

The men at company F had a slightly better diet. These men too were not housed at work. Most (52%) lived in rented rooms, 18% with their families, and 30% in hostels. For 6d. they were supplied with a midday meal, costing about 1s. 6d. to prepare, which 75% of them took regularly. This was the best-paid group. They took meat, on average (median figures) on 4·5 days a week, milk (either as a beverage or with porridge) on 2, and green or yellow vegetables on 2·5, but fish, eggs, fruit and *amasi* on 0. In spite of the slightly better diet, there was no convincing difference between their nutritional state and that of

the men at companies C, D and E, taken severally or together. This may be partly explained by the fact that they were slightly older. Their mean age was 31·9 years, compared with 29·1, 26·1, and 27·3 years at companies C, D, and E respectively.

Meal Habits

The men who were not fully fed at work were asked what food they usually took (when on day shift) before starting work. There were 27% who took no food at all, 8% who had tea only, 59% who had a cereal food, with or without tea, and 6% who had a more substantial breakfast. During working hours, only 3 men (2%) had mineral drinks at least once a week, and only 11 men (7%) took cakes or buns at least once a week.

The men at company D were questioned more fully about their usual eating habits during the day. Although these men are not provided with food by the company, certain foods are available for purchase at or near the factory. It was found that 45% took no food at all before starting work, 2% had tea only, 48% had a cereal meal, and only 5% had a more substantial breakfast. During working hours, 48% took only a cereal food, with or without tea, while 52% had meat, fish, vegetables or *amasi* as well. From the time they awoke until they left work, there were 45% who consumed nothing but cereal foods, with or without tea; some of these (18% of the total) had no breakfast.

Attitudes to Food provided by Management

There was considerable variation in the men's attitudes to the food provided by the respective companies. At company A they were satisfied with the changes in their rations, and only 18% had complaints about the food, its preparation, or serving. At company B also, the men approved of the changes in their rations, but 70% had complaints about their food. At company D, where company feeding had been stopped, the men did not favour its resumption, apparently because of the monotony of the meals previously served. At company E, 95% were dissatisfied with the soup offered them, less because it was unsatisfactory than because they would have preferred a thicker dish, such as a stew. At company C, 82% were dissatisfied with the midday meal provided, and few took it regularly. At company F, where the midday meal was similarly priced, 68% had complaints, but most took the meal regularly.

The usual grounds for complaint were the unpalatability of the food offered, the poor quality of the ingredients used, and the small quantities of meat and beans supplied.

Nutritional Knowledge

A series of questions revealed that the men's standard of knowledge about the relationship of food to health was unsatisfactory. For example, 57% thought that *phuthu* (thick maize porridge) was healthier than bread. Only 51% considered potato to be healthier than mealie rice (a refined maize product), and only 58% regarded *amasi* (sour milk) as being healthier than *mahewu* (a sour maize gruel).

The men at company A, who had been issued with daily vitamin pills for 3 weeks, were asked what the pills were for. As many as 55% said they did not know.

DISCUSSION

The men were obviously a malnourished group. Although many of the abnormalities noted were in themselves slight, and of kinds which might be related to causes other than general malnutrition, the concurrence in most of the men of a wide variety of abnormalities made non-nutritional explanations unlikely. Other studies have shown a similarly high prevalence of malnutrition among African workers in Durban.[18, 19]

The findings were consistent with the known effects of a predominantly maize diet similar to that of these workers, and were of a kind frequent among maize-eating populations.[20,21] The men's malnutrition was probably primarily dietary in origin, and related to their low consumption of animal tissues, milk, yellow and green vegetables, and fruit. Whatever the extra stresses to which the men were exposed, such as infestation and severe exertion, their diet appeared to be qualitatively inadequate to meet their needs.

Many of the signs of malnutrition are chronic and irreversible, so that our findings may in part be related to the diet and circumstances of the men before their current employment. Other of the signs found are, however, readily reversible by dietary modifications. It can thus be concluded that the condition of the men can to a considerable extent be ascribed to their current diet and circumstances. This conclusion is supported by the wide variations found among the 6 groups studied, by the occurrence of changes in the condition of representative workers at company B following the modification of their diet, and by the evidence previously found, at the same company, of a deterioration during their employment in the condition of men on a poor diet.[12]

The high prevalence of signs of malnutrition indicates that most of the men were in a sub-optimal state of health, which might affect their working efficiency. In a controlled study at a Californian aircraft factory, an association was found between the administration of vitamin supplements and a rise in efficiency together with a drop in rates of absenteeism and labour turnover.[22] Although there are few controlled studies indicating a direct relationship between nutritional state and work output on the job, there is considerable evidence suggesting that better feeding may enhance productivity.[23] On various Witwatersrand mines, for example, it has been found that the introduction of mid-shift feeding has been followed by improved performance, a reduction in accidents, or a drop in illness and accident absenteeism.[24] Similarly, a Transvaal foundry reported a 40% rise in production and a drop in labour turnover, within 4 months of the introduction of mid-morning and midday meals.[25] The managements of companies C and D commented that their workers appeared to tire easily during the day. At company B the management reported that the improvements in the men's rations since 1958 had been accompanied by a rise in productivity and a drop in absenteeism, the latter falling from 8·2%[12] to 4%; this could not, however, be regarded as a controlled observation, since there had been other concurrent changes in management policy.

PRACTICAL IMPLICATIONS

Clearly, there are many possible approaches to the problem of malnutrition among African workers in South

Africa.[26, 27] A most important contribution, however, and one which we wish to emphasize, is that which can be made by employers and employers' organizations. Apart from the provision and more effective utilization of industrial health services, 3 allied measures can be recommended — provision of good food, increased wages, and health education. It is encouraging that these recommendations have been adopted, in whole or in part, by all 6 of the companies studied.

1. *Provision of Good Food for Employees*

Where workers are housed and fully fed by the company, the management should ensure that their diet is nutritious. Competent advice should be obtained on its planning, and steps taken to ensure that the food is attractive to the workers. In this regard, the experience of company B provides an object lesson. Not only was the poor diet of 1958 associated with a high prevalence of malnutrition, but discontent with the food was at that time considered to be a possible contributory factor to the men's low morale and productivity.[12] It is not difficult to plan a diet which is both nutritious and palatable. At companies A and B dietary changes aimed at increasing the nutritional value of the rations have been welcomed by the workers. The cost of such a diet need not be excessive; the food provided by these companies cost the managements, we are informed, under 7s. and 7s. 9d. per person a week, respectively.

Our finding that the men at company A, who were housed and fully fed at work, had less evidence of malnutrition than the other groups, does not imply that housing men in barracks and providing them with good food can, in general, be regarded as a satisfactory solution. The separation of men from their families carries hazards. As has been said, 'the social, medical, economic and moral results of this migratory labour are catastrophic, and the system cannot be condemned too strongly'.[28]

Where men are not fully fed at work, they should be provided with meals during working hours, either free or at a low price, the main burden of cost falling on the company. Such meals, if reasonably palatable, are likely to be well received. At company F, although many of the men were not completely satisfied with the meal, most of them took it daily, at the price of 6d. At company C, where there was more dissatisfaction with the food, few men took it regularly, although it was priced at only 5d. The workers should be consulted and it is essential to take their preferences into account. At company E, where the men would have liked a stew, they were offered free soup, which few of them took. It is noteworthy that at 3 of the companies studied, the managements had very little idea of the men's views of the food provided for them. Fortunately, the comments of the men questioned indicate that the preferences of African labourers are not inconsistent with the planning of sound meals. For example, they frequently expressed a wish for meat and vegetable stews and for beans, which can make a valuable contribution to their diet. *Amasi*, similarly, is both nutritious and acceptable, and can be cheaply prepared from skim-milk powder. The provision of acceptable food may help to promote sound management-employee relations, and contribute to good morale.

Consideration should be given to the provision of a breakfast or mid-morning snack, particularly as many workers take little or no food before work. At certain companies, for example those handling food, the free issue of fruit or other good foods should present few problems.

Where there is a company canteen selling food to the workers, it is important to ensure that nutritious foods are available. It is noteworthy that, contrary to the usual belief, relatively few workers appear to partake of mineral drinks, cakes, and buns during working hours. It is likely that among better-paid workers there is a higher consumption of these items.

The advisability of a vitamin supplement is questionable. Where adequate food can be provided, this is probably preferable. Few men will indefinitely continue taking a tablet daily, particularly when, as at company A, they are ill-informed as to its nature and purpose.

2. *Increased Wages*

Apart from the provision of good food at work, there is a strong case for the raising of wages. The worker's home diet is of considerable importance. The findings at company F, where men were provided with a nutritious and acceptable midday meal, but were not in a better nutritional state than other workers, possibly illustrate the importance of this factor.

The mean weekly cash wages of the men not fully fed at work was £2 19s. 11d. Of these men, 66% were married, with an average of 2·5 living children. The wives of only 2% were gainfully employed. The cost of the 'minimum diet' of an African family of man, wife and 3 children, as recommended by the Department of Nutrition, Pretoria (cited by de Gruchy[29]) is £3 0s. 1d. per week, excluding the recommended addition of fruit (calculations based on average Durban retail prices in December 1959[30]). These figures speak for themselves. Under such conditions, malnutrition must remain a major contributory factor to morbidity and mortality in this country.

Most of the companies studied had either recently effected, or were contemplating, wage increases. Doubt was, however, expressed whether these increases would benefit the health of the men or their families. 'The workers won't spend more on food,' was one management's prediction. Our findings have demonstrated that the knowledge of many workers about the relative value to health of various foods is defective. Concomitant health education is therefore of considerable importance, since without it wage increases may have only a limited effect on health.

3. *Health Education*

It is not easy to alter people's food habits. However, trained health educators, who can produce valuable improvements in living habits and health,[31,35] have an important potential rôle in industry in this country. Such personnel should have little difficulty in improving workers' dietary knowledge, in modifying their habits of food buying, preparation and consumption, and in motivating them to form bulk buying clubs. At one Durban factory, health educators working in conjunction with the factory medical officer were able to produce a 100% conversion from white to brown bread consumption.[36]

Where a company contemplates changes in the provision of food or meals to its workers, such changes could use-

fully be preceded and accompanied by a planned programme of health education, to ensure their positive acceptance by the workers. Failing such a plan, changes, though well-intentioned, may produce discontent.

Few trained health educators are available as yet, and it is not realistic to suggest that one should be employed by every company. However, in view of the many ways in which such personnel could improve the health of workers and their families,[37-40] we recommend that health educators should be employed by industrial and other employers' organizations, for work in groups of companies.

SUMMARY

A study was undertaken in May 1960 of the nutritional state and diet of low-paid African labourers, aged 20 - 39, predominantly migrant, and employed at 6 companies in or near Durban.

Many varied signs of malnutrition were found. Evidence is presented that this could to a considerable extent be ascribed to the men's current diet and circumstances.

The workers' standard of nutritional knowledge was poor.

The practical implications of the findings are discussed, with special reference to the rôle of employers and employers' organizations. Three allied measures are recommended: the provision of good food for employees, wage increases, and health education.

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