

PN-AAR-94/ 36333

**WOMEN IN YEMEN:
INCREASING THE
LABOR POTENTIAL**

PNAAR94/

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INTRODUCTION

The RAPID presentation showed a grim picture of possible futures for the Yemen Arab Republic. This presentation emphasizes a resource that gives considerable hope that the future need not be so bleak.

This resource is the productive labor of the women of Yemen. The presentation will suggest ways in which the resource can be used to increase Yemen's labor potential and reduce the outward flow of scarce foreign exchange. This presentation deals specifically with three areas of the economy; agriculture, education, and health care.

AGRICULTURE

Over the 8 year period from 1975 to 1982, substantial changes occurred in the foreign exchange picture of Yemen. Total Imports, shown in the solid line number 1, rose from less than 2 billion Yemeni Rials in 1975 to over 8 billion in 1980. At the end of the period they seem to have levelled off at around 7 billion rials.

Exports, shown in the heavy dashed line number 2, also rose between 1978 and 1982 but amounted to only 217 million rials at their peak in 1981. They fell to half that level, 113 million rials, in 1982.

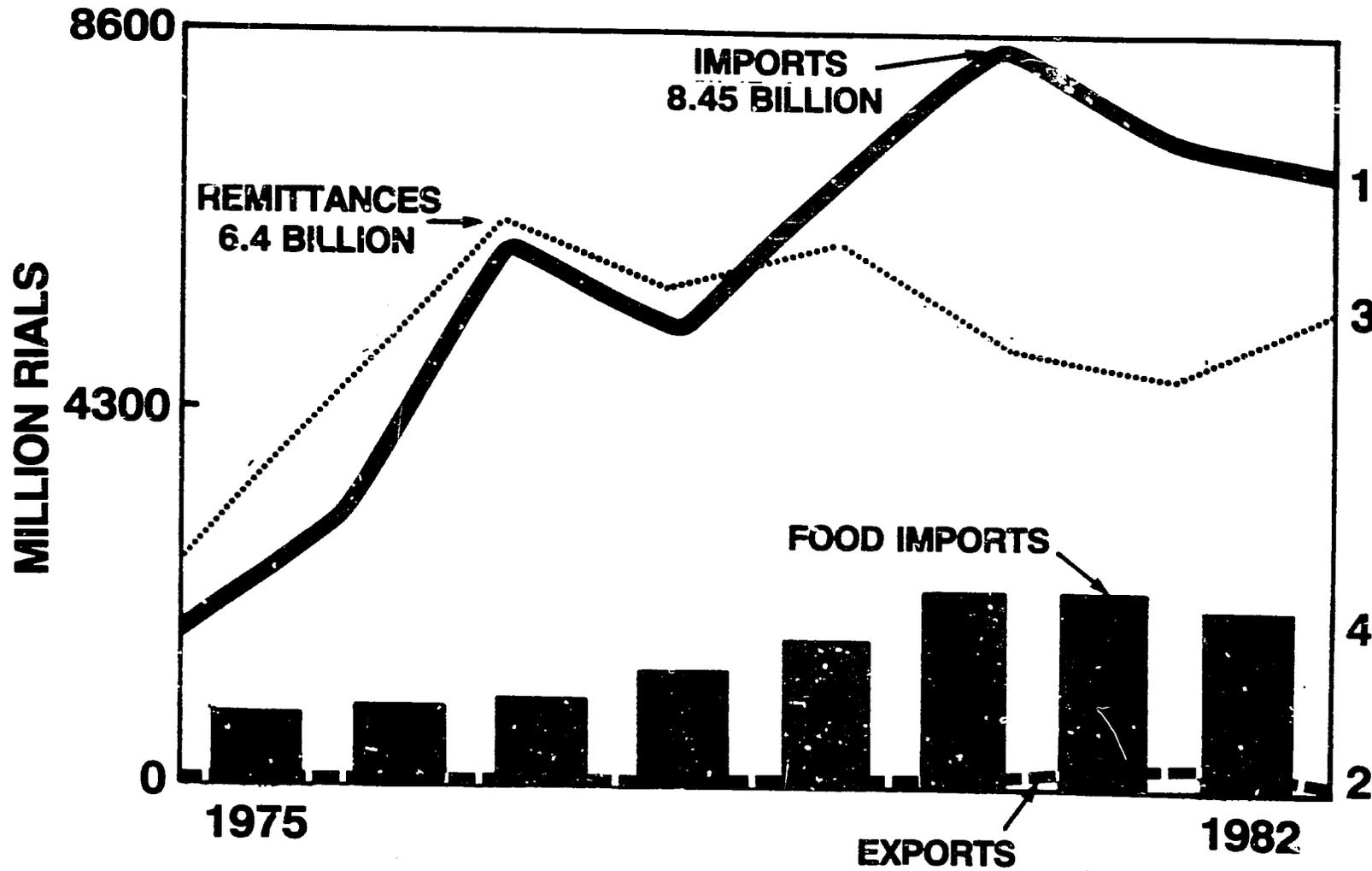
But Yemen does not depend on the export of materials as a major source of foreign exchange. By far the greatest export of Yemen is labor. As a result, the money that workers in other countries send back (remittances) is the greatest source of foreign exchange. These remittances, shown in the dotted line number 3, rose from 2.4 billion rials in 1975 to a peak of 6.4 billion in 1977. As late as 1979 they were still greater than or nearly equal to the level of imports.

However, in the years after 1980 imports continued to rise for two years after remittances peaked. It appears that although both imports and remittances have stabilized somewhat, they have done so at levels that put imports about 1 1/2 billion rials higher than remittances.

High levels of imports are not unusual for a country with economic growth as intense as Yemen's. Typically these imports include materials and equipment for modernization and must be considered a wise investment in the future. But sometimes significant amounts of the import bill are taken up by food. This may restrict the pace of modernization because it absorbs large amounts of money that could be invested in development.

As shown in the solid bars, it seems that in Yemen food imports are a substantial portion of overall imports. In fact, they appear to be about the same size as the foreign exchange gap.

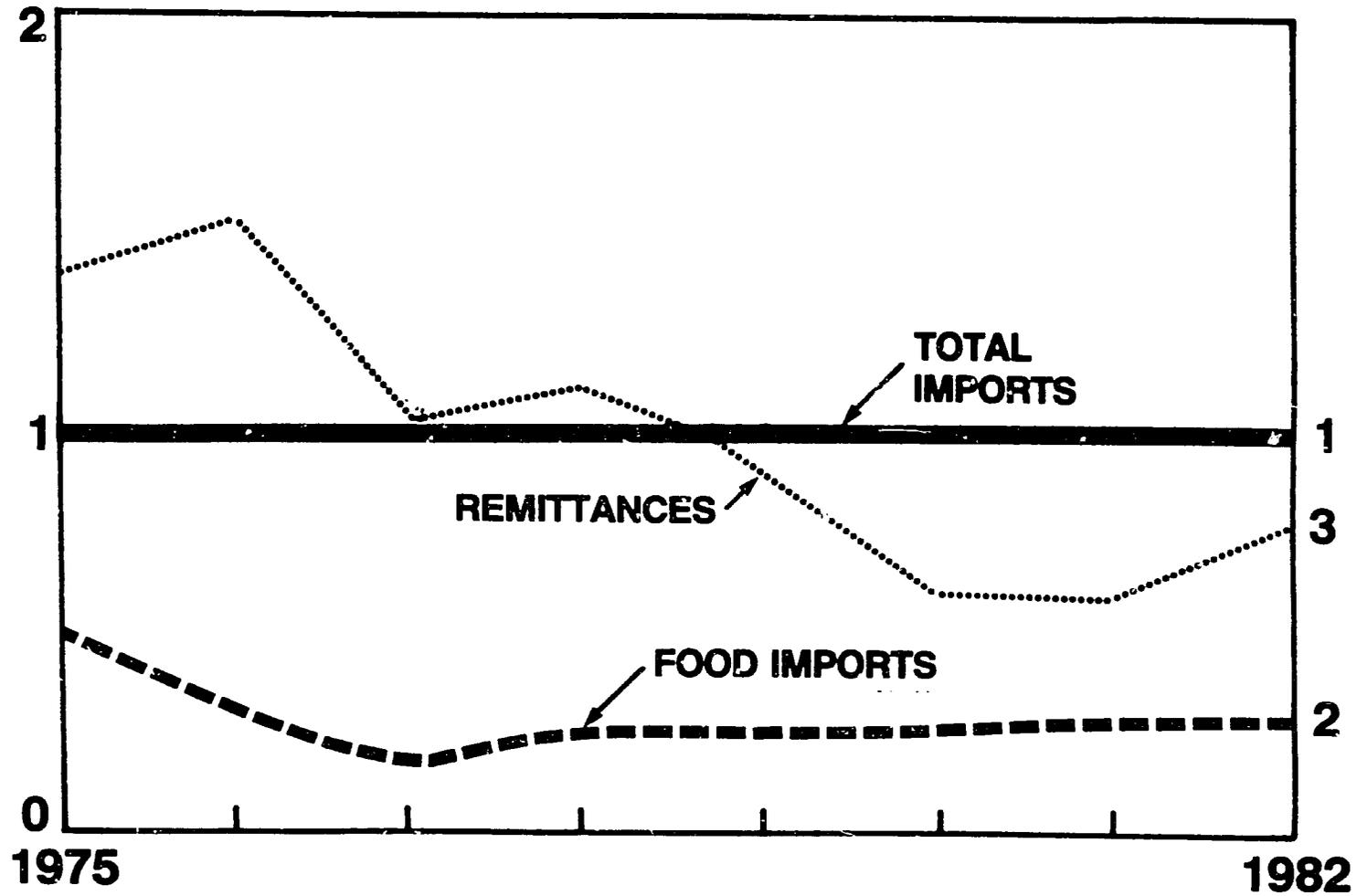
IMPORTS AND EXPORTS



This next display is designed to show a little more clearly the proportional relationship between overall imports and food imports. Here, the level of overall imports is assigned the value 1 and is displayed as the solid line number 1 across the middle of the page. Other values will be shown in proportion to the overall import level. Food imports are shown by the heavy dashed line number 2 in the lower portion of the page. On this scale you can clearly see that in recent years food imports seem to be constant at about 30 percent of overall imports.

On the same scale, the dotted line number 3 shows that remittances have dropped from as much as 1 1/2 times imports to a value in recent years of only 70 or 80 percent of the import level.

PROPORTION OF IMPORTS



This display shows what foods made up these food imports in 1978 and again in 1982. Here you see food items divided into seven groups. The numbers across the middle of the display are the level of 1978 and 1982 imports in millions of rials. You can see that for all groups except eggs the level of imports increased significantly.

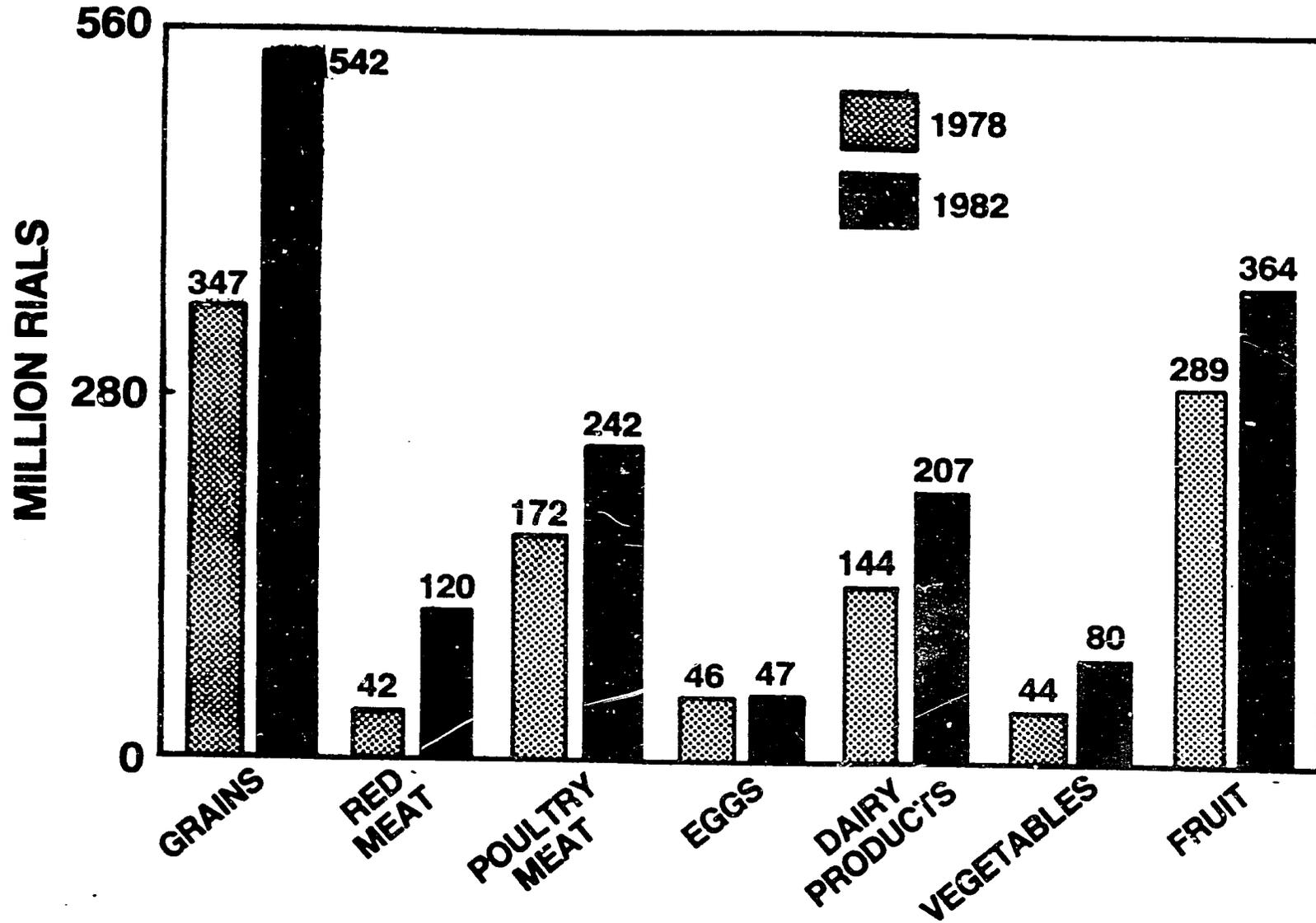
Overall agricultural production within Yemen during the same period did not decline, however. In fact, the total value of agricultural products over the period increased from 3 billion rials to 3.8 billion; over 25 percent. If agricultural production has been increasing and food imports also increasing it must mean that increases in production have simply not been able to keep up with increases in demand. If this is the case, then there must be something holding production back or slowing its growth. What could it be?

There are, of course, a large number of items that could limit the growth of agricultural production. Four items present themselves at first glance; land, water, money, and labor. In fact, these factors are very much interdependent and it is hard to separate the impact of one from the others. With that said, however, it must be recognized that there is evidence that labor is probably the major limitation.

One indication of this is that when you deduct for changes in prices you find that the rate of increase in domestic agricultural production has been almost exactly the same as the rate of increase in the laborforce; about 2 to 3 percent per year. In addition, the large number of rural workers that have left for higher paying jobs seems to indicate strongly that Yemeni agriculture is being limited by the availability of productive labor.

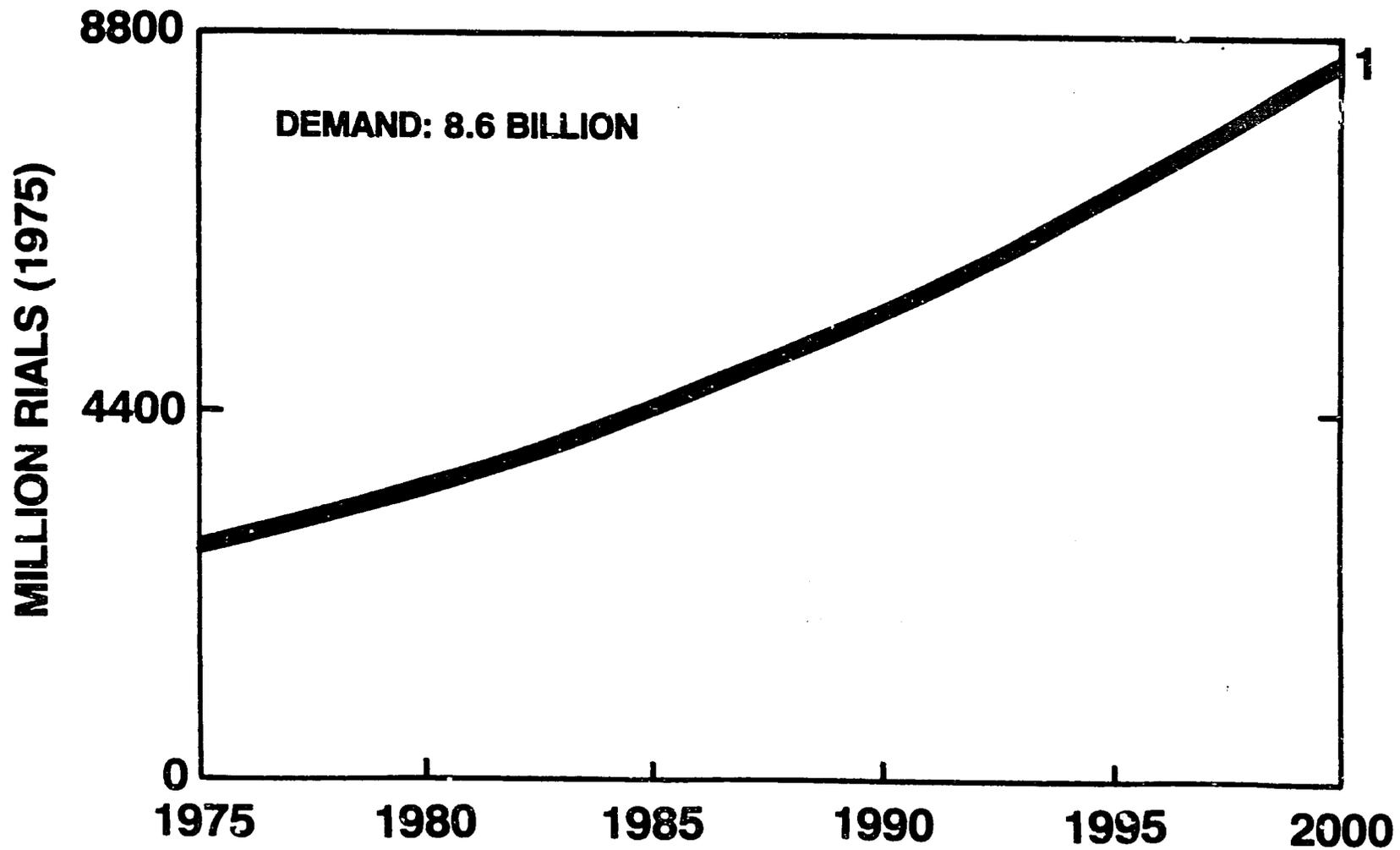
It must also be pointed out that recent drought conditions that have affected agricultural production occurred after the period examined here and represent an additional, more temporary limit. This means that when weather conditions change this limit will probably be removed but the barrier presented by the labor shortage will probably continue.

FOOD IMPORTS



With this assumption in mind, we can make some projections of food supply and demand to the year 2000. First, we will project food demand. Historically, food demand has been about 35 percent of the total Gross National Product. If we project growth in Gross National Product at an annual 4 1/2 percent over the period and food demand to continue at 35 percent of GNP we arrive at total food demand, as shown in the solid line, rising from about 2.8 billion rials in 1975 to 8.6 billion in the year 2000. Please note that this projection is in constant 1975 rials.

FOOD DEMAND



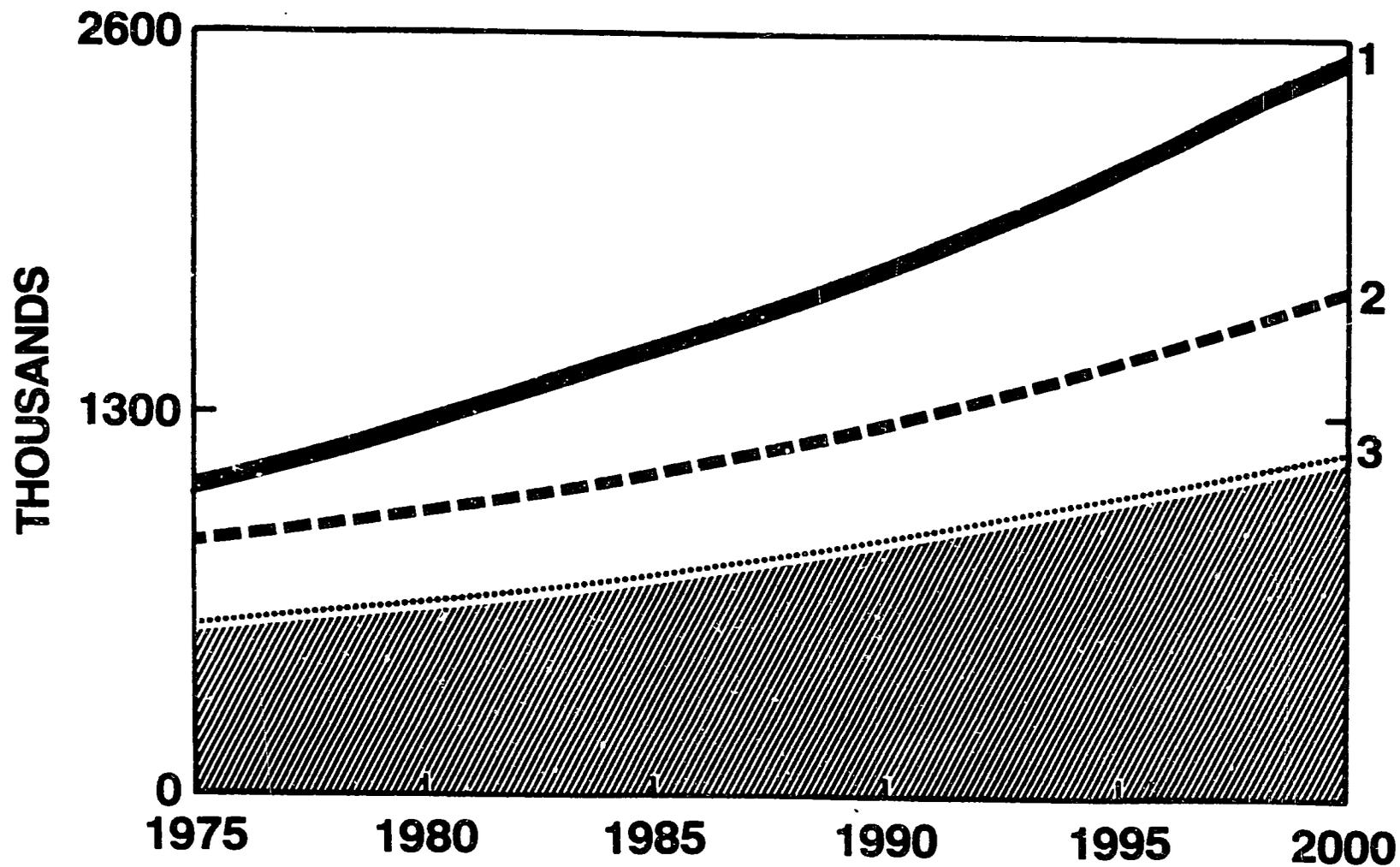
Projecting labor supply over the same period we see that the total number of available rural males between the ages of 15 and 59, as shown in solid line number 1, will rise from 1 million in 1975 to around 2 1/2 million in the year 2000.

However, about 50 percent of the 15 to 34 year old males leave the rural area to work in the cities or other countries. This leaves only those shown in heavy dashed line number 2 as the rural domestic laborforce.

Of this male rural domestic laborforce, only 69 percent work in agriculture. This is shown in dotted line number 3 and the shaded area at the bottom of the display. This remaining laborforce only grows from around 570 thousand in 1975 to 1.2 million in the year 2000. This increase of around 2 to 3 percent per year must be compared to the food demand curve which was increasing at 4 1/2 percent per year.

Some have pointed out that many of the men that have left for jobs in other countries may return to Yemen because of the discovery of oil there. Although this may be true, these men will still be returning to construction jobs and positions in the cities created by the oil industry. Their labor would still remain out of the agriculture sector.

MALE AGRICULTURAL LABOR FORCE



This next display places the food supply and demand curves on the same scale. This scale takes all projected values as measured in constant 1975 Riials. Both food demand, as shown in solid line number 1, and food supply, as shown in heavy dashed line number 2, are shown in constant 1975 units. It also shows food imports as the shaded area between the food demand and food supply lines.

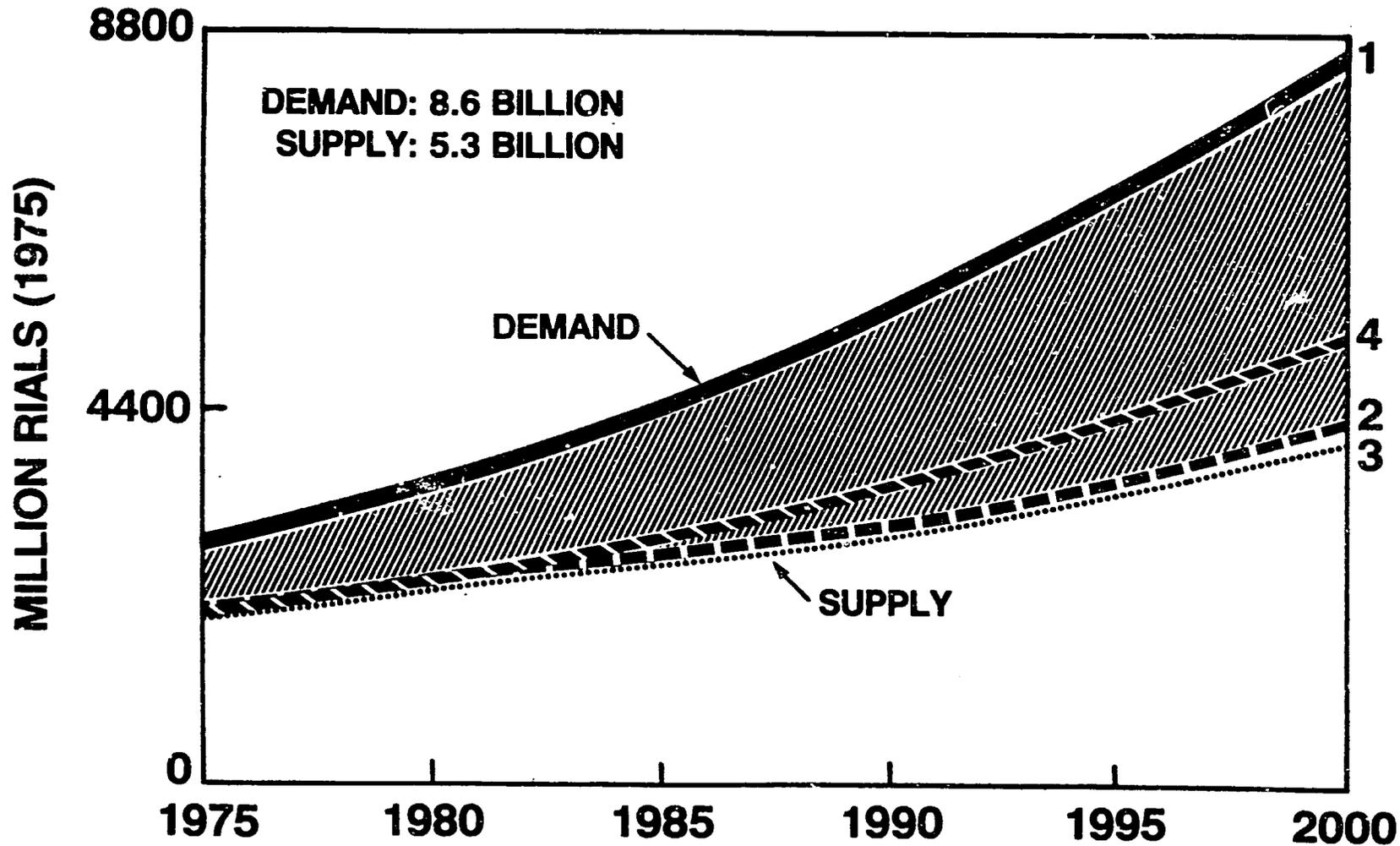
In 1975, Yemeni agricultural production satisfied about 3 billion or around 70 percent of the total food demand of 3.8 billion riials. Food imports in 1975 were about 800 million riials. In this display you can see that by the year 2000 food demand can be expected to rise to 8.6 billion riials while food supply can only be expected to rise to 4.2 billion. This means that food imports would rise from 800 million riials to 4.4 billion; more than five times the level of 1975 food imports. This also represents a drop in food self-sufficiency from more than 70 percent in 1975 to less than 50 percent in the year 2000.

It is initially surprising, but if we include the female laborforce in the food supply projection there is nearly no impact on this initial projection. The food supply projection shown in dotted line number 3 is nearly identical to that shown in line number 2. This is because this display is only affected by differences in growth rates. The female laborforce is growing at about the same 2 to 3 percent per year level as the male laborforce and so the projection based on this growth rate is about the same.

One of the obvious weaknesses of the projections shown in lines number 2 and 3 is that they assume that the productivity of labor hours is constant over the projection period. As a general rule, this is not the case. With education and extension programs, labor hours tend to become more productive over time.

The diagonal dashed line number 4 shows a food supply projection that includes a typical productivity increase due to the present extension and education programs. In this projection it is assumed that the productivity of labor hours increases by 2 1/2 percent per year starting now, in 1985. Although this does raise food production in the year 2000 by over 1 billion riials to a value of 5.3 billion riials, the required food imports are still over 4 times their 1975 value.

FOOD DEMAND AND SUPPLY



To investigate ways in which domestic agricultural production might be increased we found it useful to look at a 'typical' agricultural family. This family has 8 people; two older adults, two younger adults, two adolescents, and two young children. There is one male and one female in each category. However, one of the males, in this case the younger adult, has gone off to work in the city or another country. This leaves only the seven people shown.

Next to each person is a clock on which will be shown the way each person divides his or her work time. The printed percentage values beside each clock are the percent of work time spent in agriculture.

For the older male, the bulk of the day is spent in agricultural activities as shown in the heavy diagonal striped area. Only about 10 percent of his time, shown in the solid area, is taken up by marketing or other non-agricultural work.

For the adolescent male, about half of his time, shown by the diagonal stripes, is spent in agricultural activities. The remaining half, shown in the solid area, is taken up primarily by school.

For the youngest male, only perhaps 10 percent of his time, the striped area, is in productive agriculture. The bulk of his time, shown in the solid area, is taken up either in school or simply in playing and growing up.

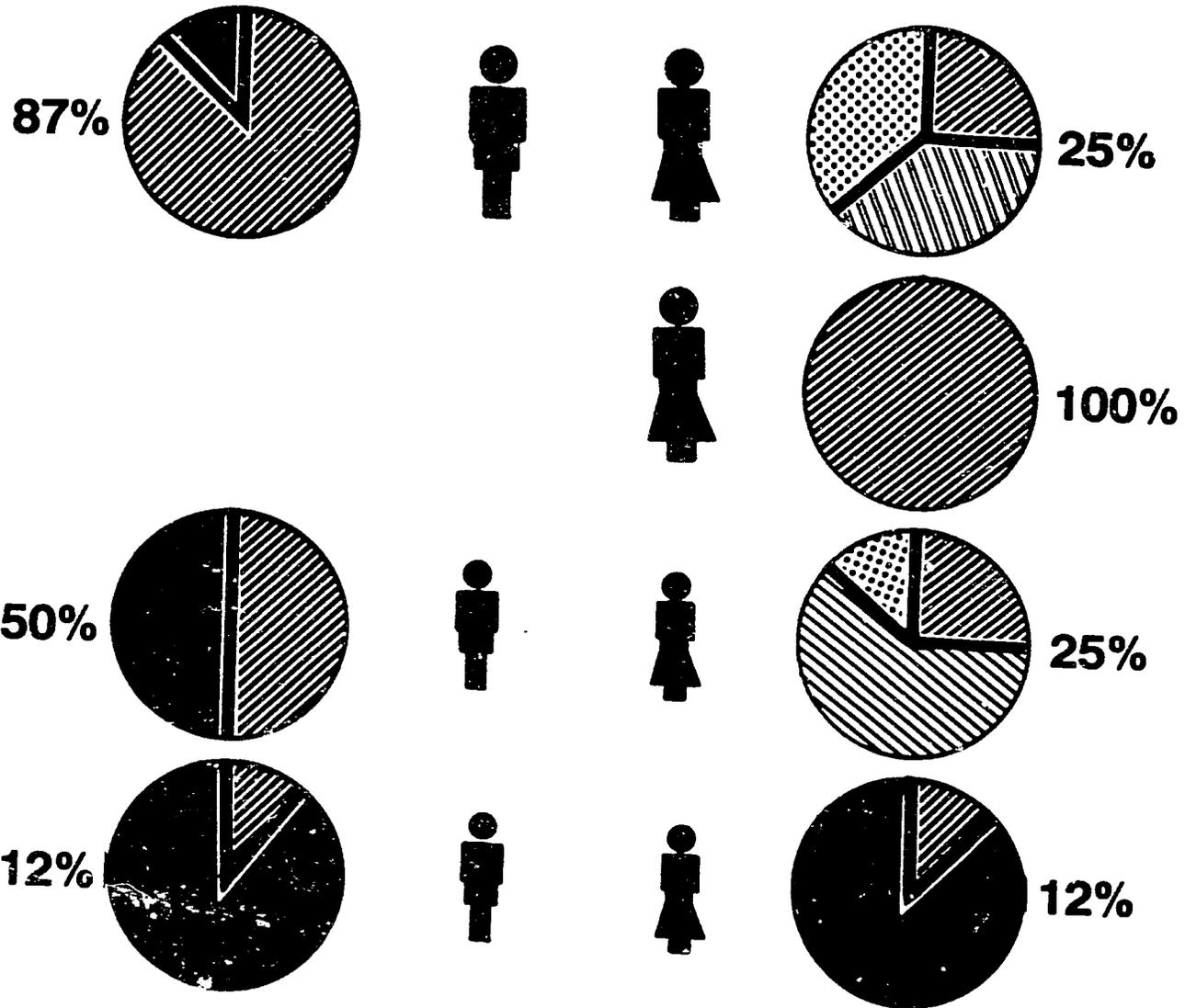
On the other side of the family we begin with the older female. She spends perhaps 25 percent of her time (the heavy diagonal striped area) in agriculture, usually not in the field, but around the home in poultry and cattle raising. The bulk of her time is taken up either in fuelwood collection (the diagonal double-striped area) or in domestic tasks such as food preparation (the dotted area).

The younger adult female spends essentially all of her productive time in agriculture, mostly in field activities.

The adolescent female is able to spend only about 25 percent of her time (the heavy striped area) in agriculture because the bulk of her time is taken up in water collection (the lighter striped area). She also has some domestic responsibilities (the dotted area).

The youngest girl spends her time in a manner very similar to her little brother.

THE AGRICULTURAL HOUSEHOLD



Looking at these time allocations, the important question is, "Is there waste and low productivity time that could be converted to agriculture?". On the male side, the activities seemed to be mostly agriculture, school, or other activities that are either of fairly high productivity or are investments in increasing future productivity.

On the female side, however, it appears that there may be some opportunity for improvement. Three types of low productivity time were shown on the female side; fuelwood collection, water collection, and domestic activities.

Two technological changes can have a significant impact on these three activities. First, it has been estimated that village level water supply might reduce water collection time from around 5 hours to around 1 hour per day per household. Second, it is clear that use of commercial fuels would eliminate fuelwood collection time entirely. Commercial fuels also reduce the time required for domestic tasks significantly. Some estimates are that food preparation time can be reduced from 4 hours per day to only 1.

In this display is shown the possible impact that these two technological changes might have on the ability of these women to work in agriculture.

The older female might have as much as 90 percent of her time (the striped area) available for productive agriculture such as poultry raising and dairy activities. This is because her requirement for fuelwood collection has disappeared completely and only 10 percent of her time (the dotted area) is now required for food preparation.

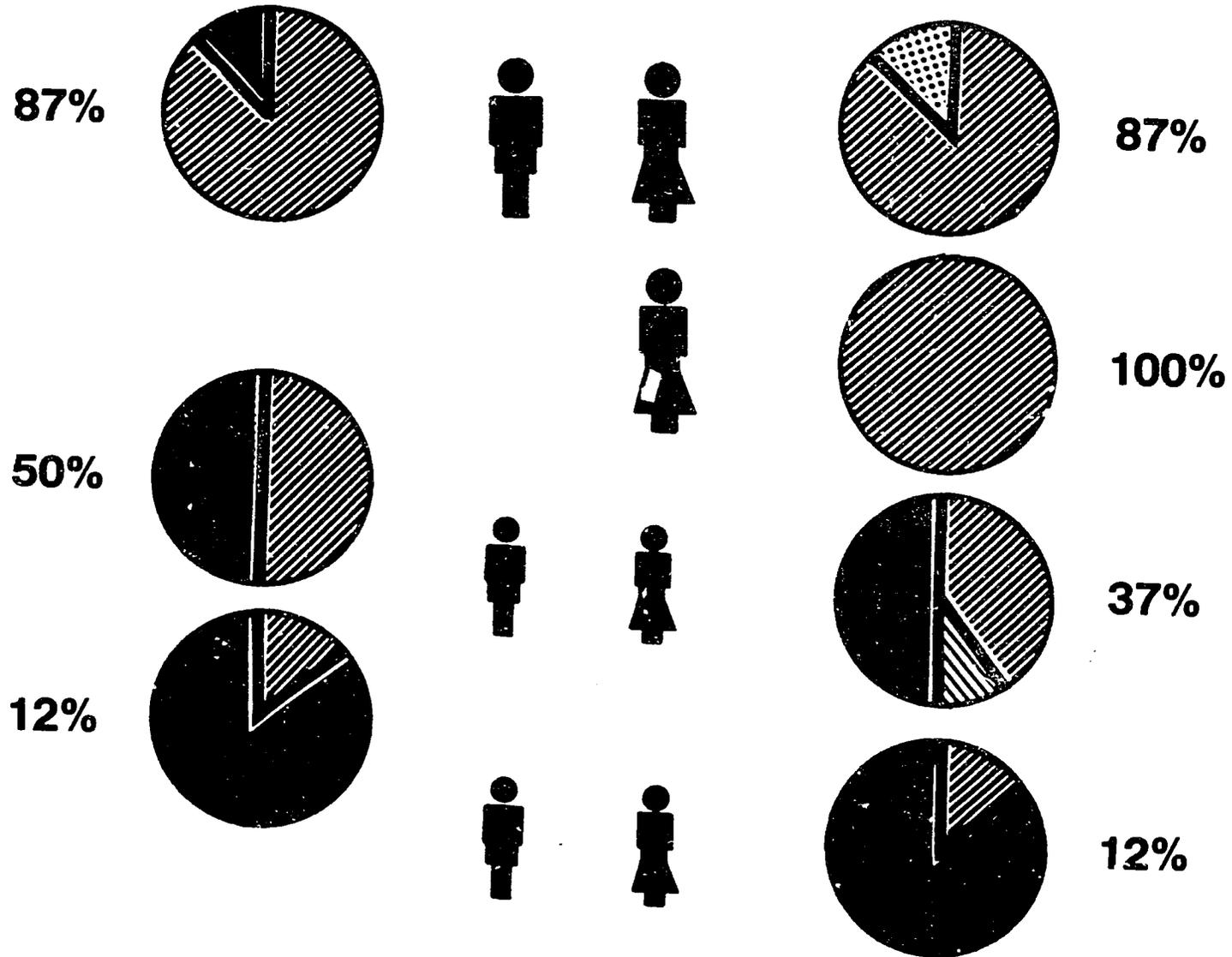
The younger adult female is still able to spend full time in agriculture.

The adolescent female is able to both increase her time in agriculture (the heavy striped area) and have time to remain in school (the solid area) like her older brother. This is because the time for water collection is now only 10 percent of her day (the lighter striped area). Her new-found time to stay in school will become important later in our discussions of other areas of the economy.

The youngest girl is unaffected.

Looking at the labor time in summary you will note that the time for the older female workers in agriculture has increased from 1 1/2 person days to 2 1/4 person days, an increase of 50 percent.

THE AGRICULTURAL HOUSEHOLD



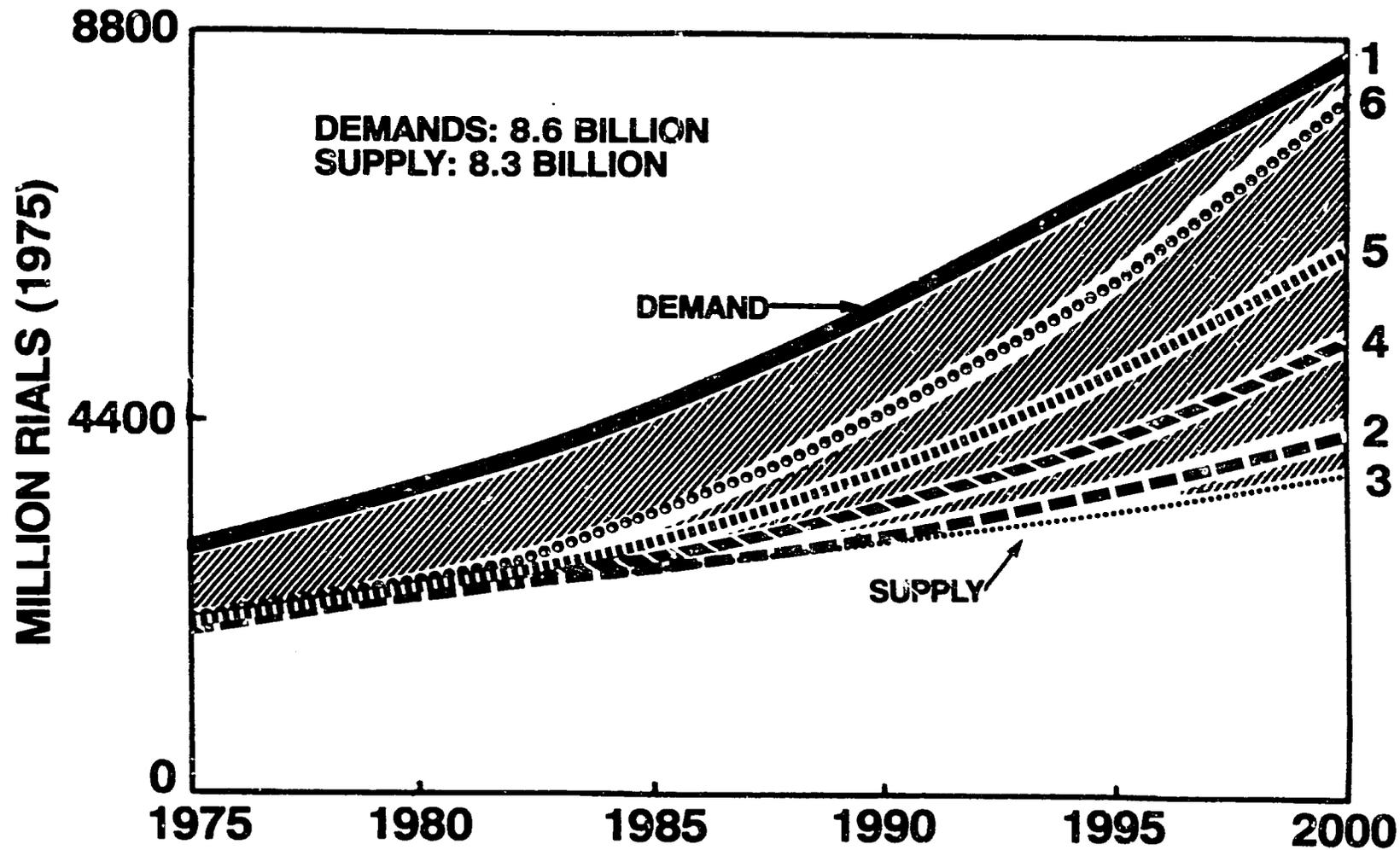
In this display, we reexamine the food supply and demand projections to see what the effect of this change in labor time might be. As we left it, lines 1 through 4 and the shaded area representing imports were already in place.

If we add the increased participation of women so that their hours have increased by 50 percent in the year 2000 we can increase the food supply, shown in the short dashed line number 5, by another 1 billion rials. Although this is a significant increase, a still greater increase is desirable.

Remember that when we put up the increased productivity line (the diagonal dashed line, number 4) we said that it represented the increases that might be expected to occur from the present education and extension programs. The present programs are directed primarily at males. If we were able to increase the productivity of female labor hours by the same 2 1/2 percent per year by extending similar programs to them, we could increase food supply to the values shown in large dotted line number 6.

The combined impact of the increased labor time available and the increased productivity of that time is quite significant. The food supply projection has now increased to 8.3 billion rials. That leaves a food import gap of only 300 million rials, less than half the size of actual 1975 food imports.

FOOD DEMAND AND SUPPLY



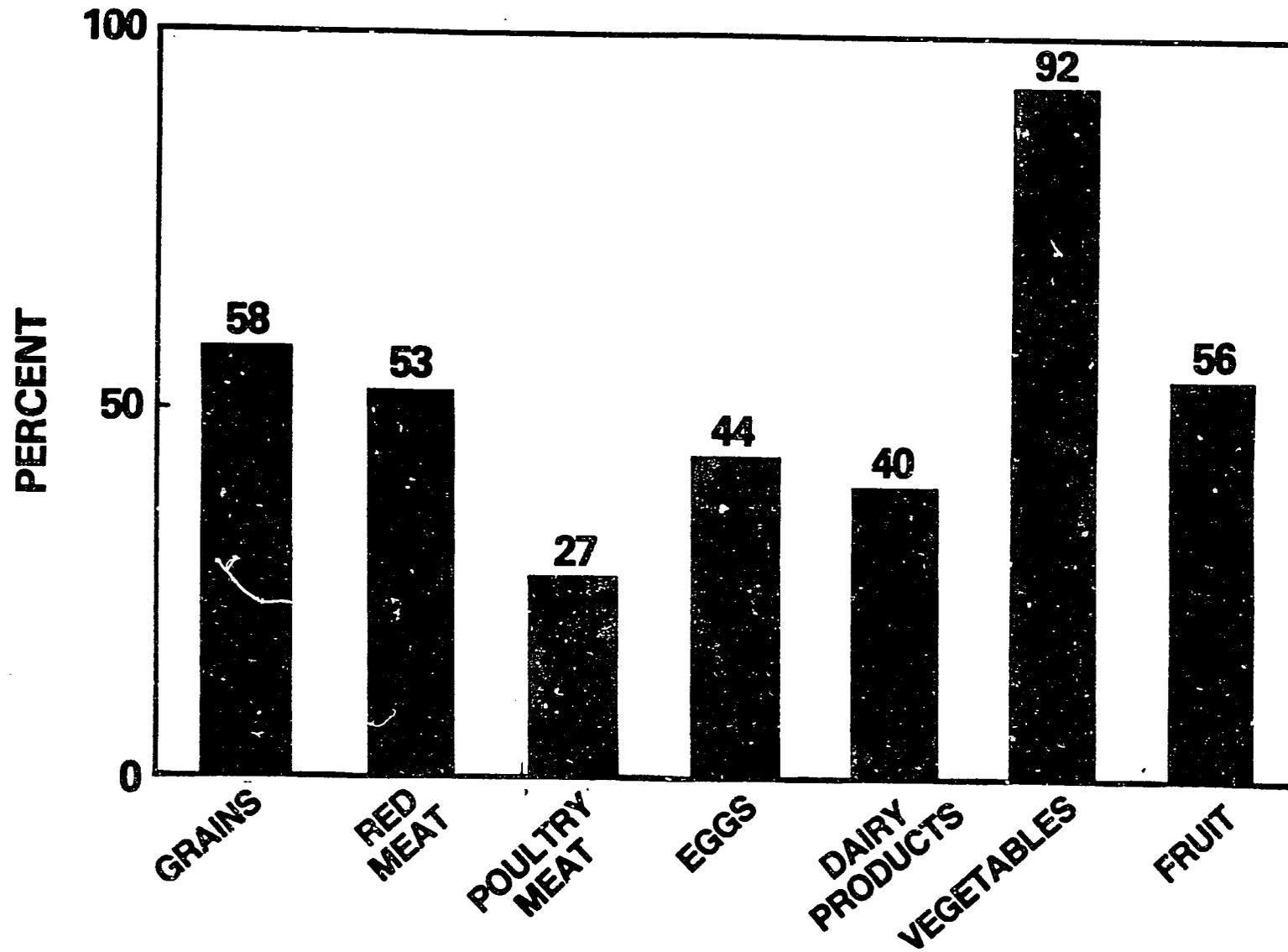
This display further emphasizes the importance of women to the future of Yemeni agriculture. Shown here are the food self-sufficiencies for each of the seven food categories. Note that the four worst categories are red meat, poultry meat, eggs, and dairy products. The production of all of these foodstuffs is woman dominated. This is an indication that the goods produced by increased female agricultural labor would probably be the products that Yemen needs most.

Summarizing what we've seen in agriculture before moving on to other sectors:

First, food imports represent a significant barrier to investment in products that are necessary for the expansion of Yemen's modern sector and they are likely to be an increasing barrier in the future.

Second, the two keys to increasing domestic food production lie in one, making available increased female labor time for agricultural activities through technological improvements such as village water supply and commercial fuels and two, increasing the productivity of that labor time through education and extension. That bears repeating, technology and education combined can increase female labor time and productivity.

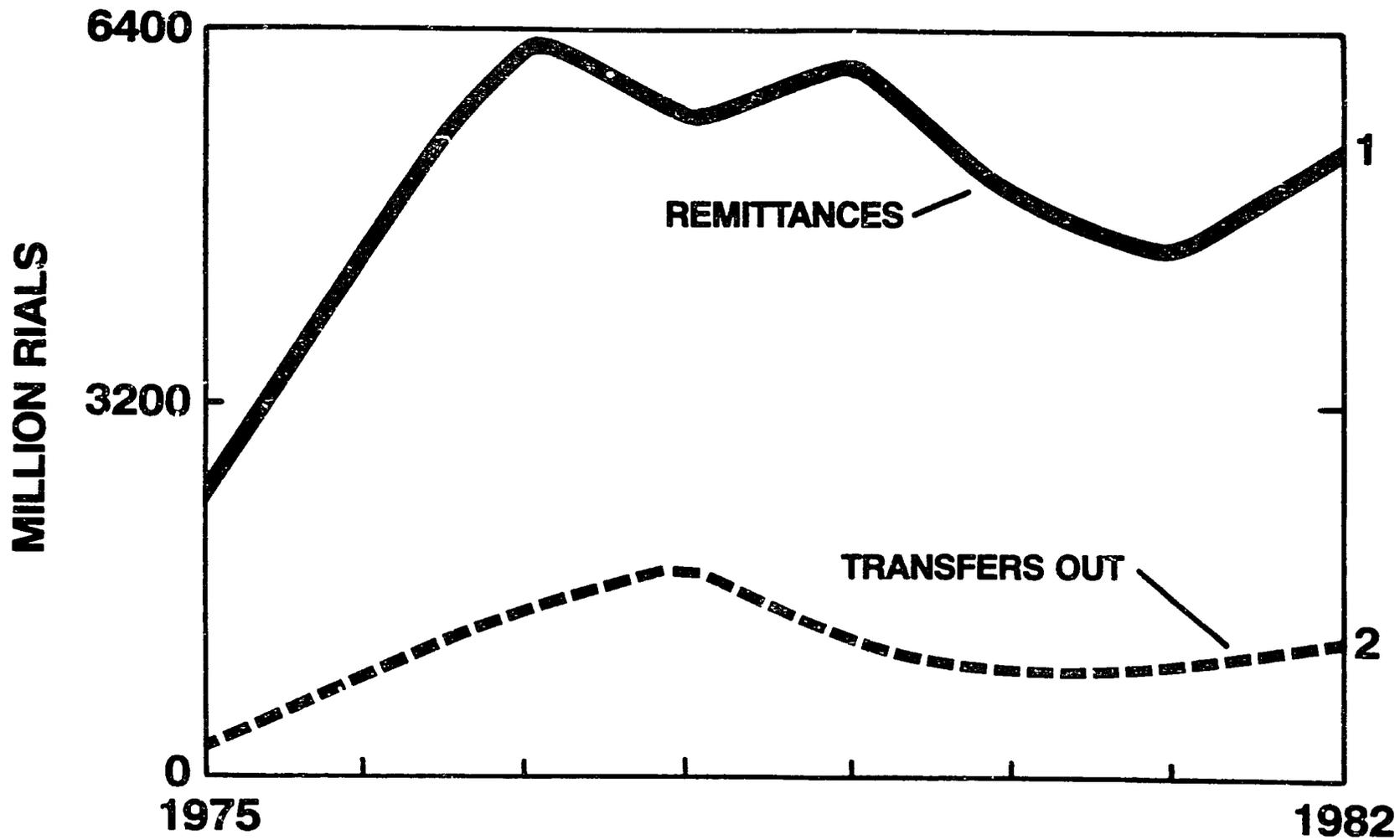
FOOD SELF-SUFFICIENCY



EDUCATION

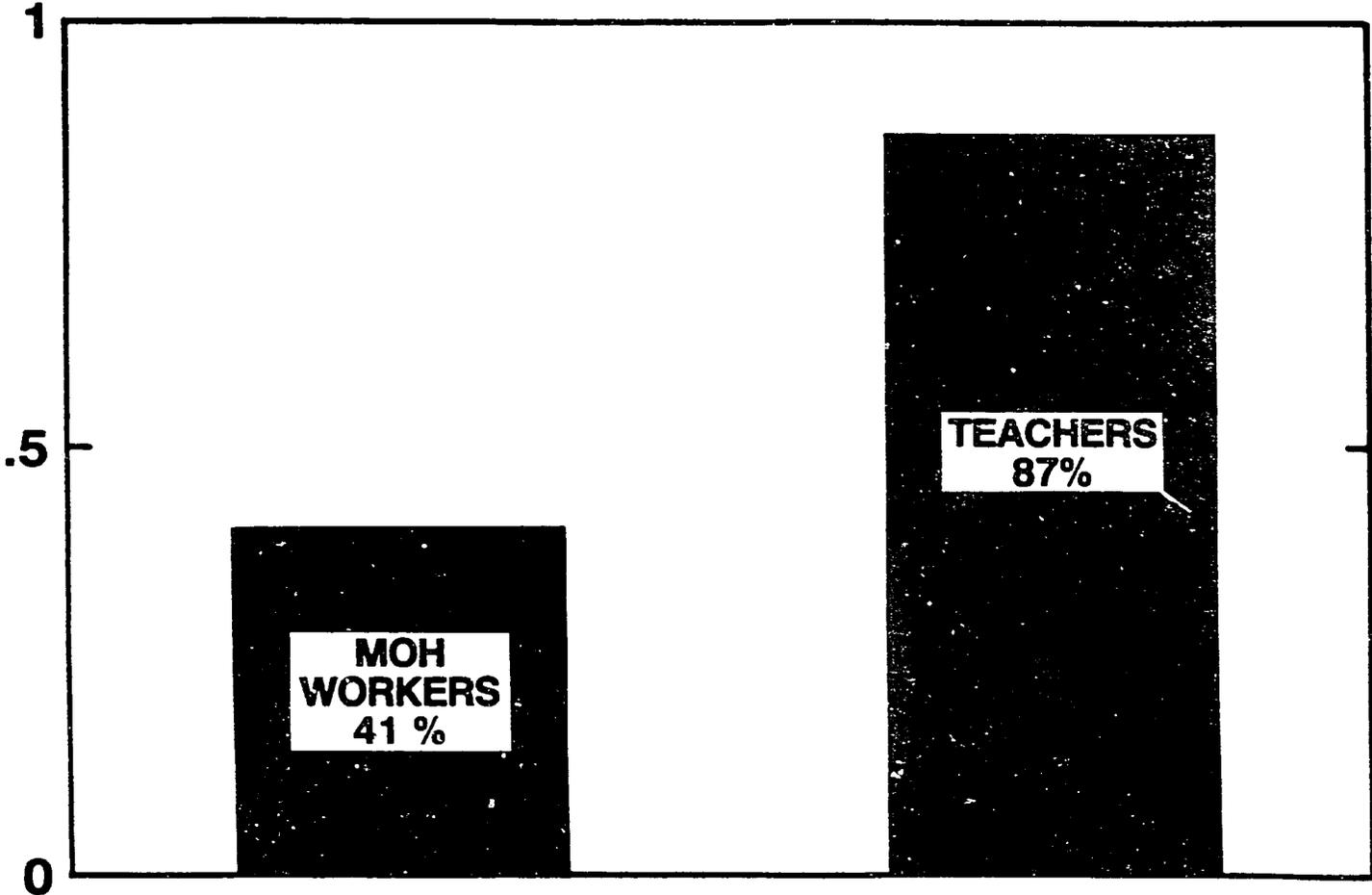
We've seen that food imports represent a major foreign exchange drain, but they are not the only one. In this display the graph of money from Yemeni workers in other countries is shown in solid line number 1. But, on the same scale, we can see the flow of money out of Yemen from expatriate workers in this country (the heavy dashed line number 2). Around 20 percent of the money from workers in other countries in effect turns right around and flows back out. But that's not all. In addition, this display does not reflect the fact that the education system is largely financed by other countries and staffed by expatriates, primarily Egyptians. At present levels some 600 million rials flows straight from other countries to Egypt rather than into Yemen.

REMITTANCES AND TRANSFERS OUT



How significant is the number of expatriate workers in Yemen? Data are not available for many areas but we do have data for workers in the Ministry of Health and for teachers. In 1983, the most recent year for which we have data, 41 percent of Ministry of Health workers and 87 percent of all teachers were expatriates. In addition, it must be pointed out that the Ministry of Health expatriates are heavily weighted toward the highest skill positions. Over 50 percent of doctors and nearly 2/3 of nurses were expatriates.

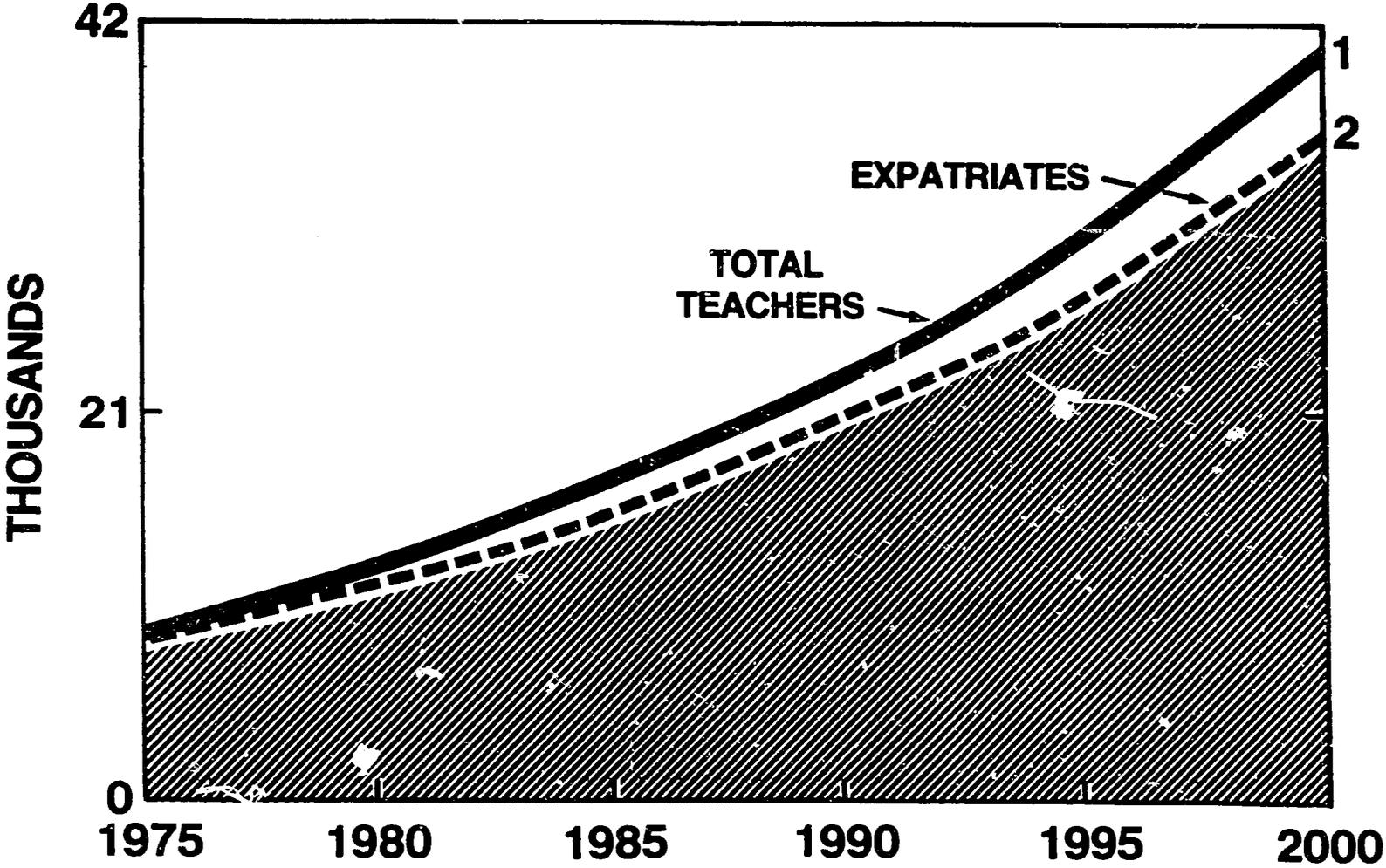
FOREIGN LABOR



In this display is shown a projection of the number of teachers required in Yemen to the year 2000. Assuming a constant increase of 1 percentage point per year in all male enrollment rates, the number of teachers required in Yemen (shown in solid line number 1) will rise from 9 thousand in 1975 to over 40 thousand in 2000.

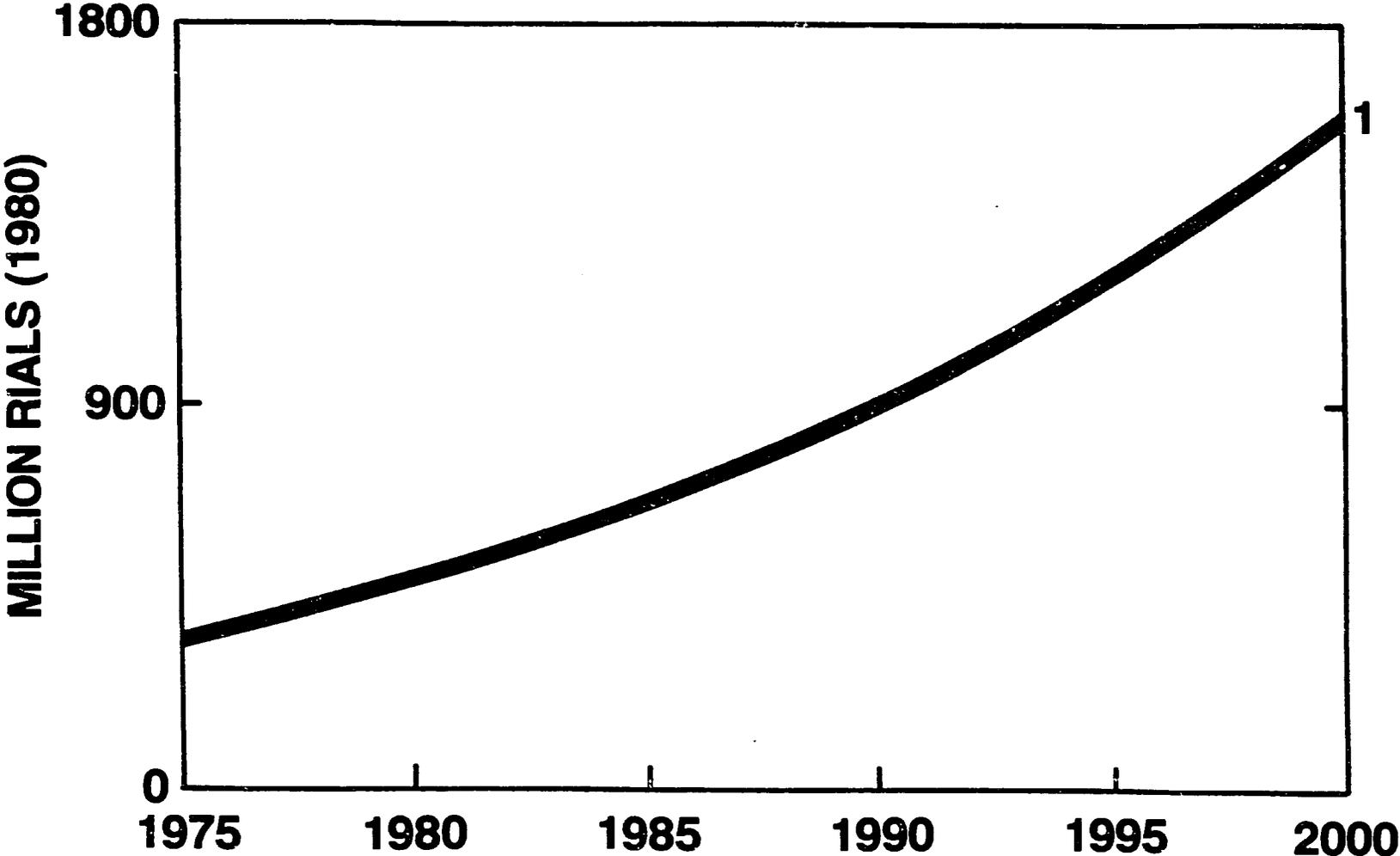
Assuming that 90 percent of these positions continue to be filled by non-Yemenis, there will be 36 thousand expatriate teachers (shown in heavy dashed line 2) in Yemen in the year 2000. The entire shaded area is expatriates while only the slim slice between lines 1 and 2 is Yemeni.

TEACHER REQUIREMENT



The estimated foreign exchange cost of these expatriate teachers, which either represents money that could come to Yemen but continues to pass through, or money that Yemen will have to pay if the other donors decrease education funding, will rise from 400 million rials in 1975 to 1.7 billion in the year 2000. This amount is equivalent to the entire 1979 food import bill.

ANNUAL COST OF NON-YEMENI TEACHERS

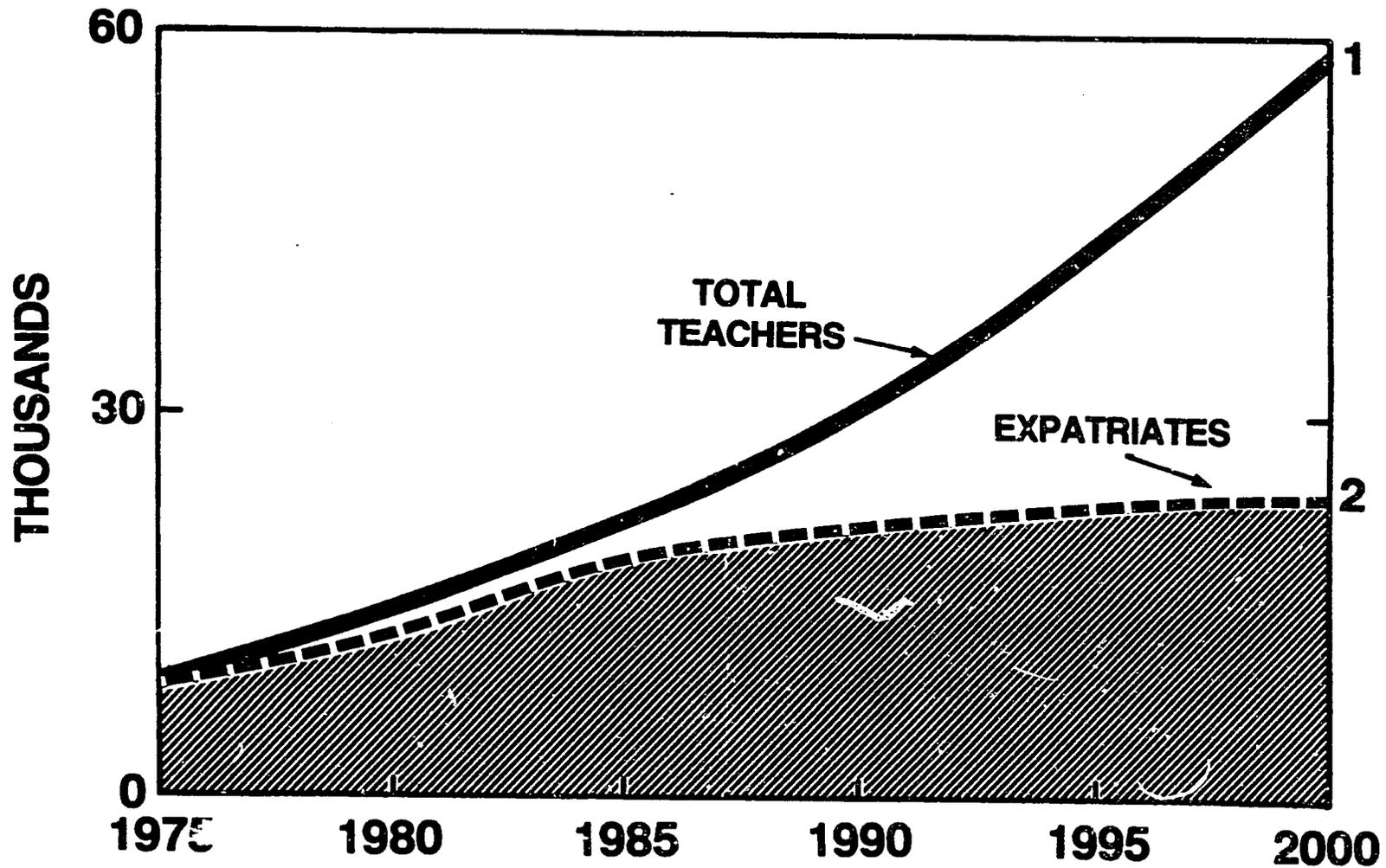


How can the resources of Yemeni women be used to ease this situation? Some investment is required but the payoff is very short and very good.

In this display it has been assumed that all female enrollment rates increase at the same 1 percentage point annual rate that had been projected earlier for males. The impact, shown in solid line number 1, is an increase in the teacher requirement from 40 thousand in the year 2000 under our previous assumption to nearly 60 thousand. Since more teachers just cost more money, that really hasn't helped solve our problem. However, shown in dashed line number 2 is the number of these teachers that would still be expatriate if just 10 percent of the secondary school graduating girls became primary school teachers.

Even though the first increased class of graduates doesn't become available until 1990, the impact is dramatic and very quick. In fact, all primary school teacher positions could be filled very quickly under this scenario and efforts could be devoted to preparatory and secondary school teachers which have a similar but slightly longer term payoff. The number of expatriate teachers required in the year 2000 would be reduced from 36 thousand to 24 thousand.

TEACHER REQUIREMENT

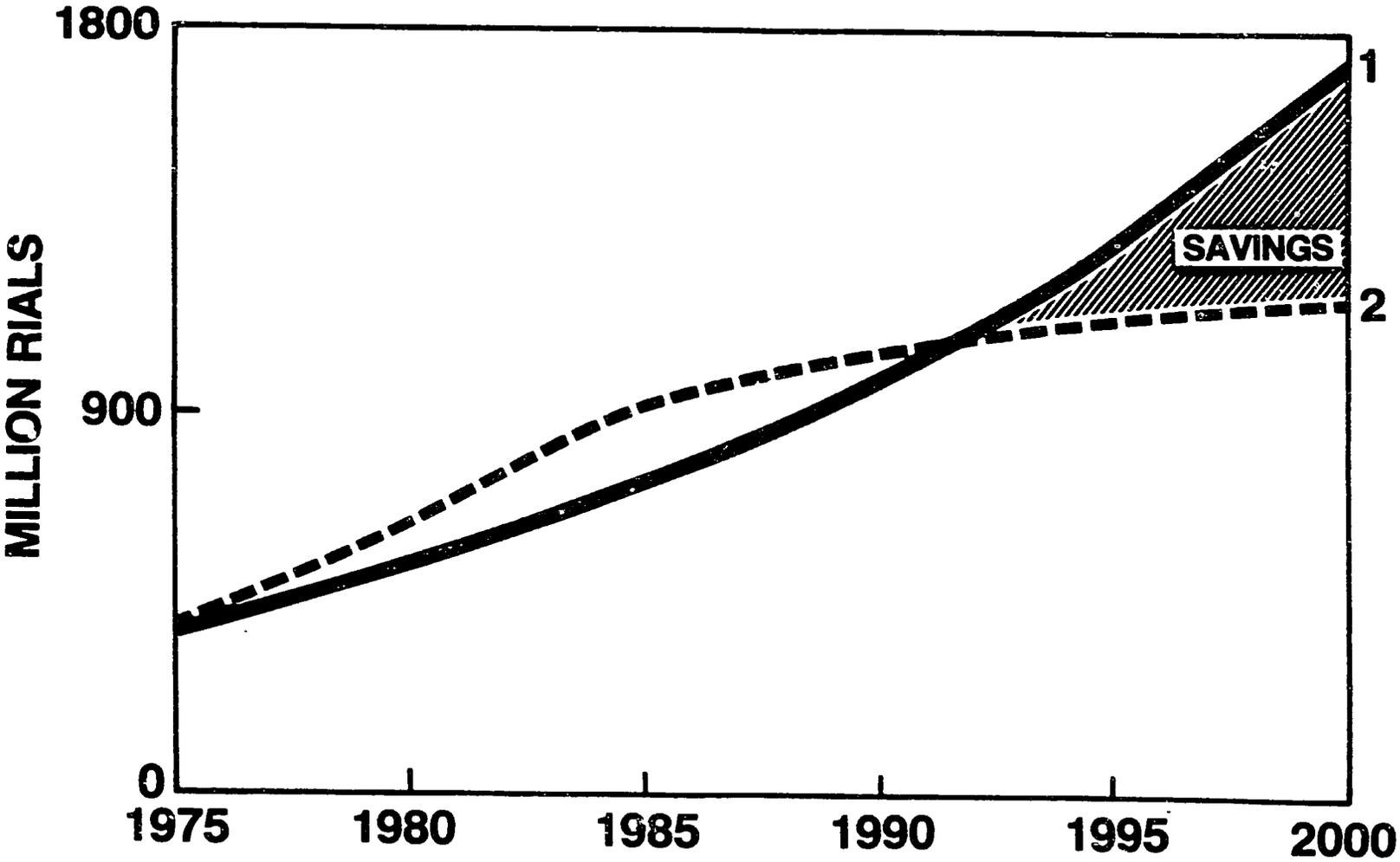


This display shows the monetary impact of this program in terms of foreign exchange. The payments required for non-Yemeni teachers under the previous assumption are shown in solid line number 1. The cost of expatriates with the increased participation of Yemeni women is shown in dashed line number 2. With increased female enrollments, it is not surprising that the cost for expatriate teachers is initially higher. But they become balanced between 1990 and 1995. After that, the money flowing away from Yemen is reduced significantly. The savings shown in the shaded area represent nearly 2 billion rials. The annual payment in the year 2000 would be down to 1.2 billion rials; a reduction of 500 million rials per year.

People frequently point out that using these women as teachers removes them from the agricultural laborforce and is therefore in conflict with the previous section. However, this entire new teacher corps amounts to only around 12,000 women. Even if this entire force were drawn from rural areas, this represents only 1/2 of one percent of the female agricultural workforce. The impact of this miniscule reduction in the laborforce is more than compensated for by the increased productivity of the better educated workers.

To summarize again before proceeding to the next section, we have seen that, as in the agriculture section, technologies that allow time to take advantage of education and the increased productivity resulting from that education were the keys to reducing foreign exchange outflows by increasing the potential of a resource already available in Yemen.

ANNUAL COST OF FOREIGN TEACHERS



HEALTH CARE

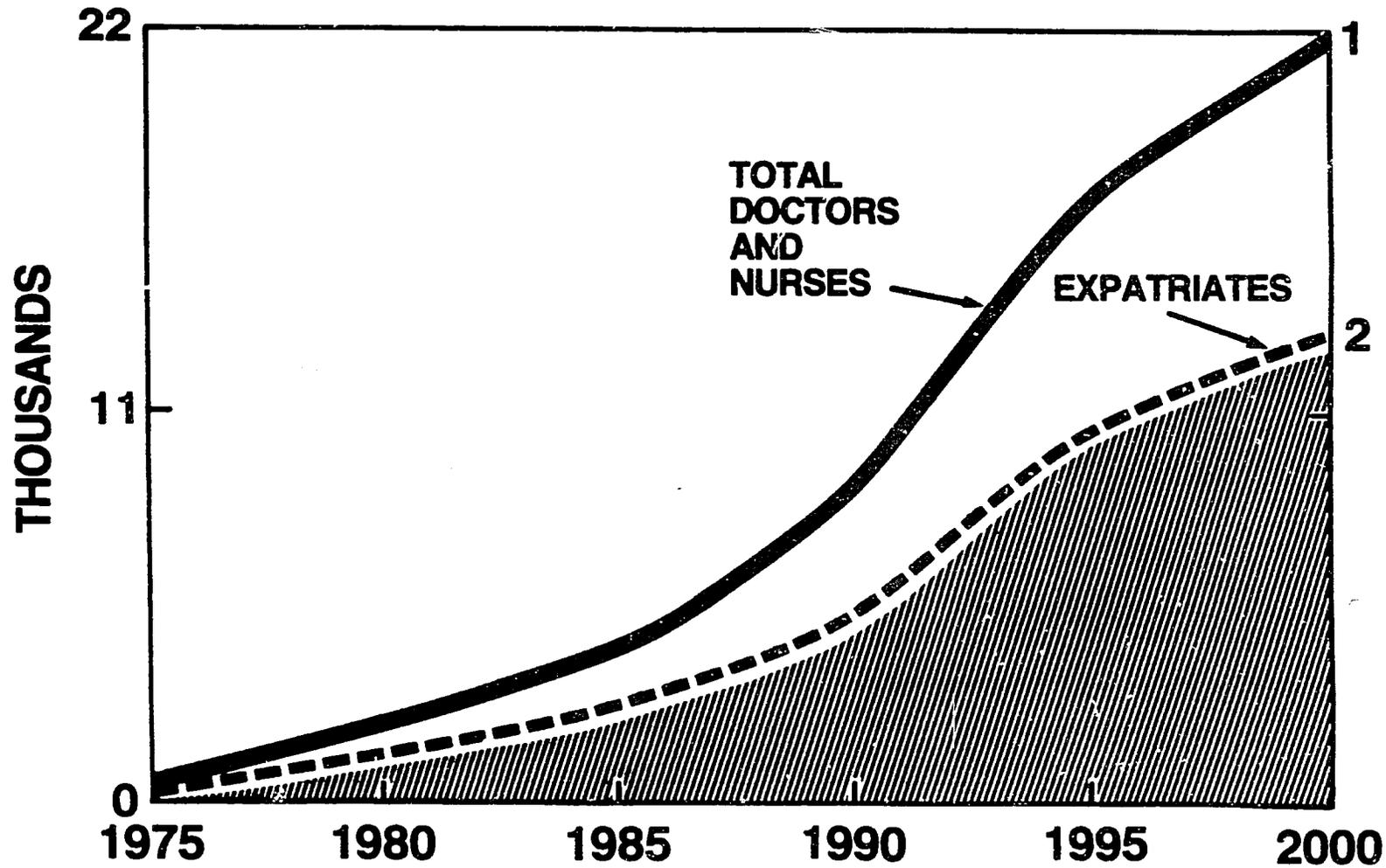
In the health care sector the situation is very similar to that of education. A significant proportion of the workers, particularly the highly skilled ones, are expatriates. In addition, it is generally recognized that the health care sector is badly understaffed. Because of this, the country's development goals include objectives relating to the vast expansion of health care services.

In 1980, it was estimated that health care was available to only around 12 percent of Yemen's people. The stated goal of the government is health care for all, but there is a lot of work to do before this can become a reality. To be a little more conservative, the projection shown in this display is based on the assumption that health care can be provided to 50 percent of the people by the year 2000.

Under that assumption, the total number of doctors and nurses in Yemen will have to rise from about 2,200 as it was in 1983 to a value of some 22,000 in the year 2000. This is shown by the solid line number 1.

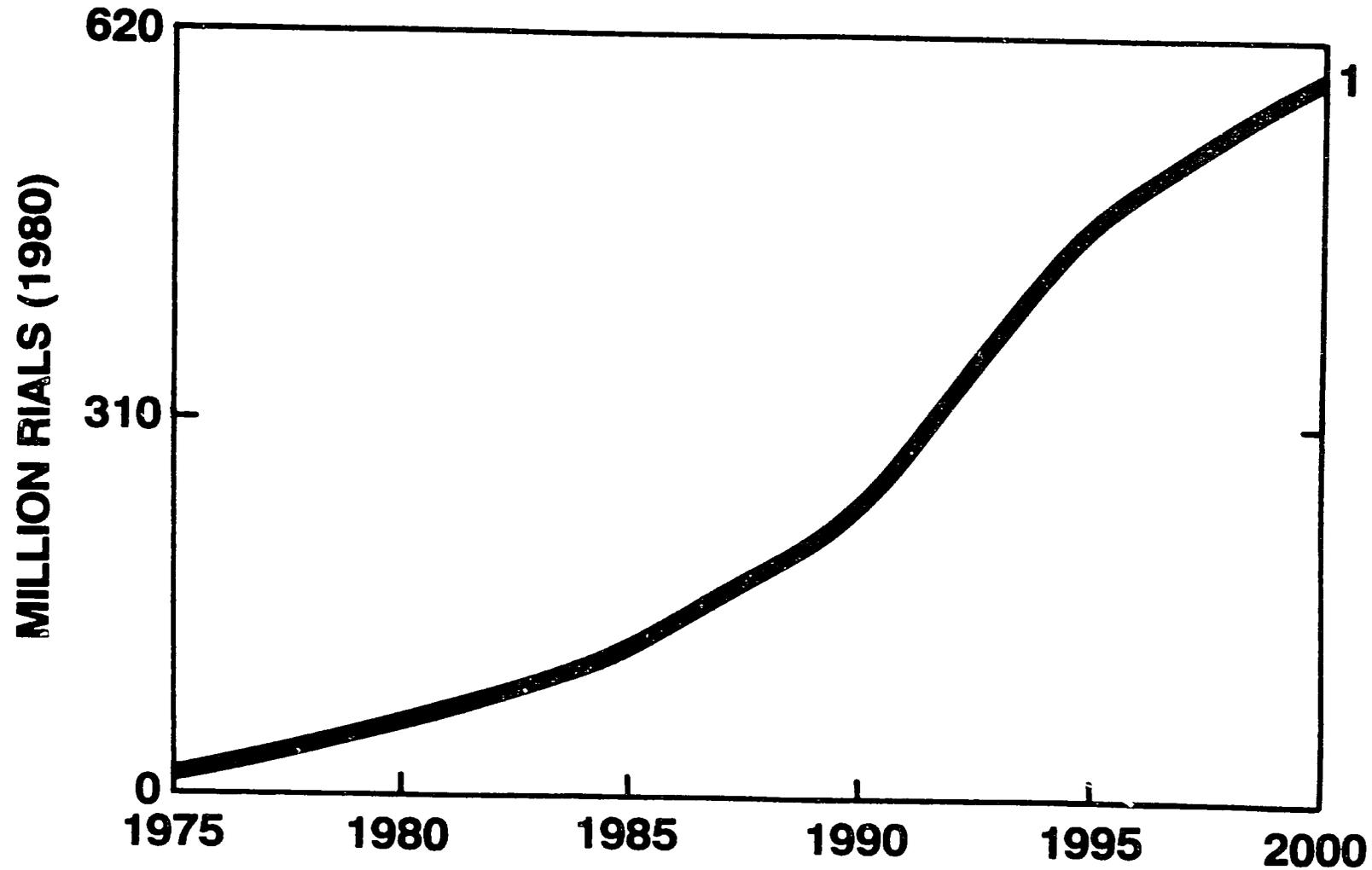
Even assuming that the current expatriate proportions of 56 percent for doctors and 65 percent for nurses are maintained, 13,000 of these doctors and nurses will be expatriate as shown in heavy dashed line number 2.

MOH DOCTORS AND NURSES



The cost of these foreign workers in foreign exchange outflow will increase from a value at present of around 80 million rials to a value in the year 2000 of nearly 620 million rials. This is shown in the solid line.

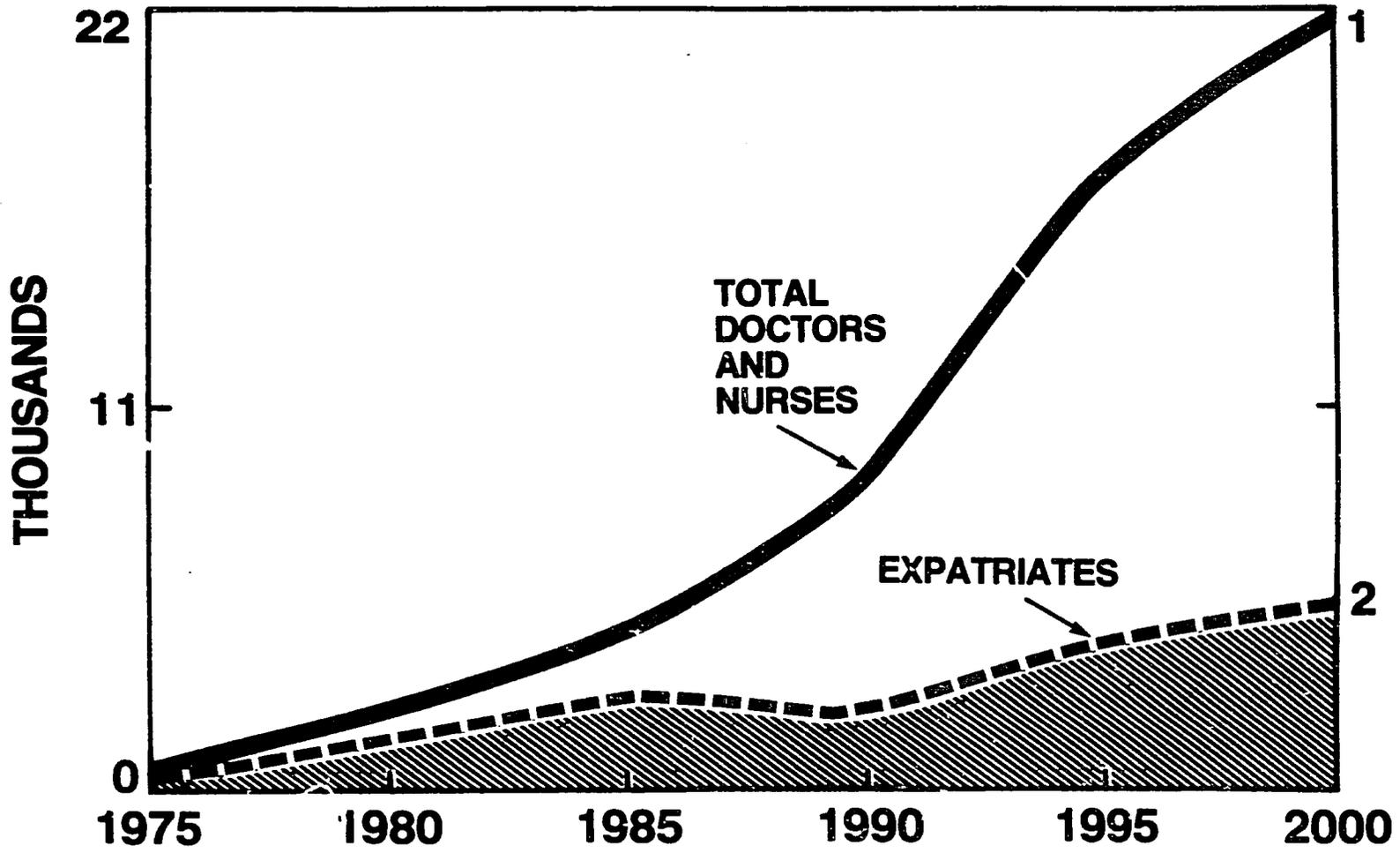
ANNUAL COST OF NON-YEMENI DOCTORS AND NURSES



Again, just as we did in education, we can see a display that shows how the application of women's resources might help reduce this outflow. First, shown in line number 1, is the doctor and nurse requirement as shown before. Compared to this, in dashed line number 2, is the number of required expatriates if it is assumed that 10 percent of the secondary educated girls could be used as nurses.

Much as we saw in education, the application of female resources to the problem made a significant difference very quickly.

MOH DOCTORS AND NURSES

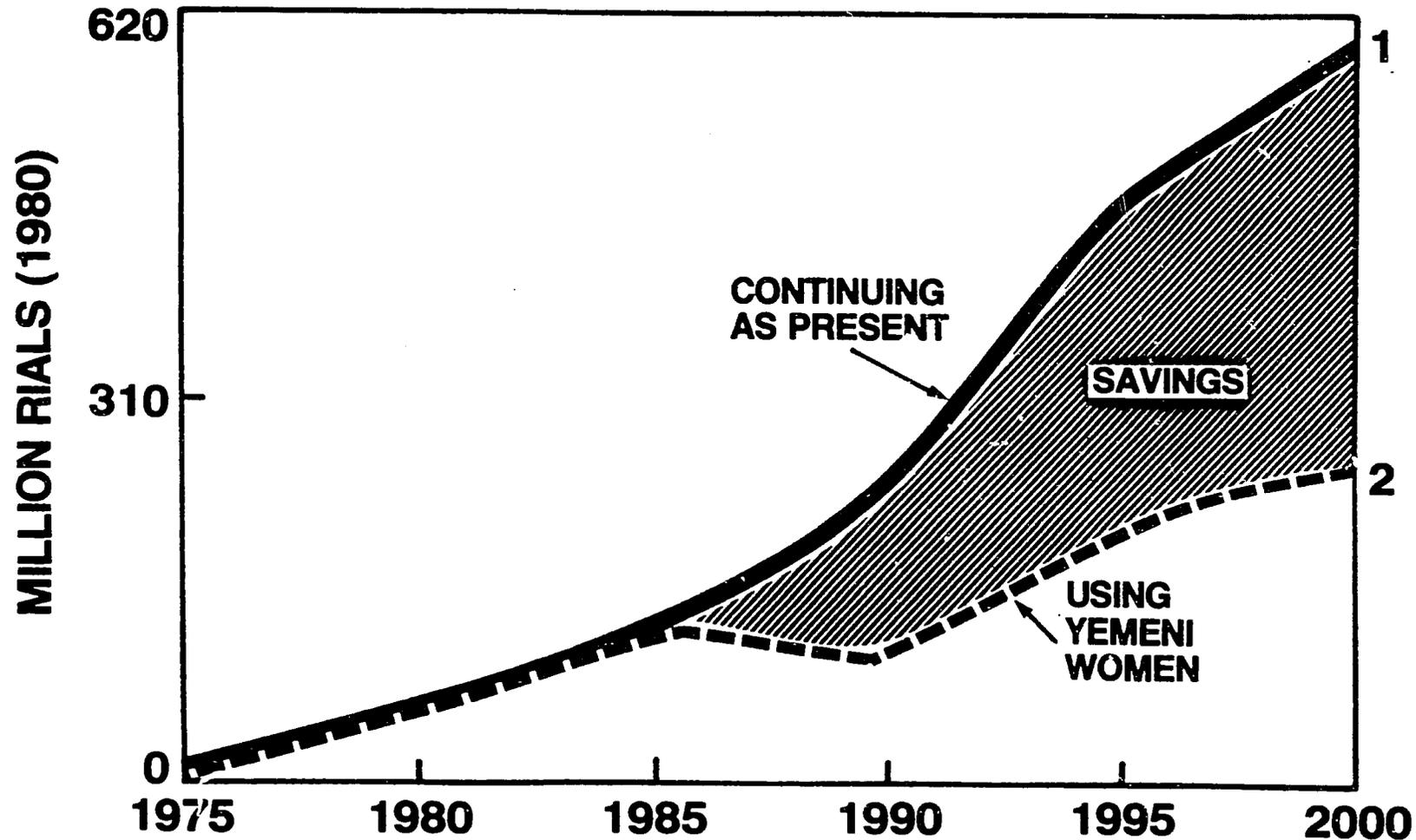


Looking at the foreign exchange impact of this change we can compare the foreign exchange outflow under the previous assumption, shown in solid line number 1, to the foreign exchange requirement with increased participation of Yemeni women as shown in dashed line 2. It is easy to see that the foreign exchange outflow in the year 2000 has been cut in half. The entire shaded area is savings that can be invested in development and modernization.

In addition, it must be pointed out that this projection only applied women as replacements for the expatriate nursing staff. There certainly is every reason to apply them against the requirement for foreign doctors as well. The payoffs are even larger since doctors are paid more than nurses, but the investment time is also longer since the education requirements are longer.

Again it must be pointed out that although the number of women is very significant to the required number of health care workers, the total change is only around 6,000 women. This clearly is not significant enough to have an impact on the agricultural laborforce. The impact that the healthier population might have on agricultural productivity, however, is inestimable.

ANNUAL COST OF NON-YEMENI DOCTORS AND NURSES



TOTAL LABORFORCE

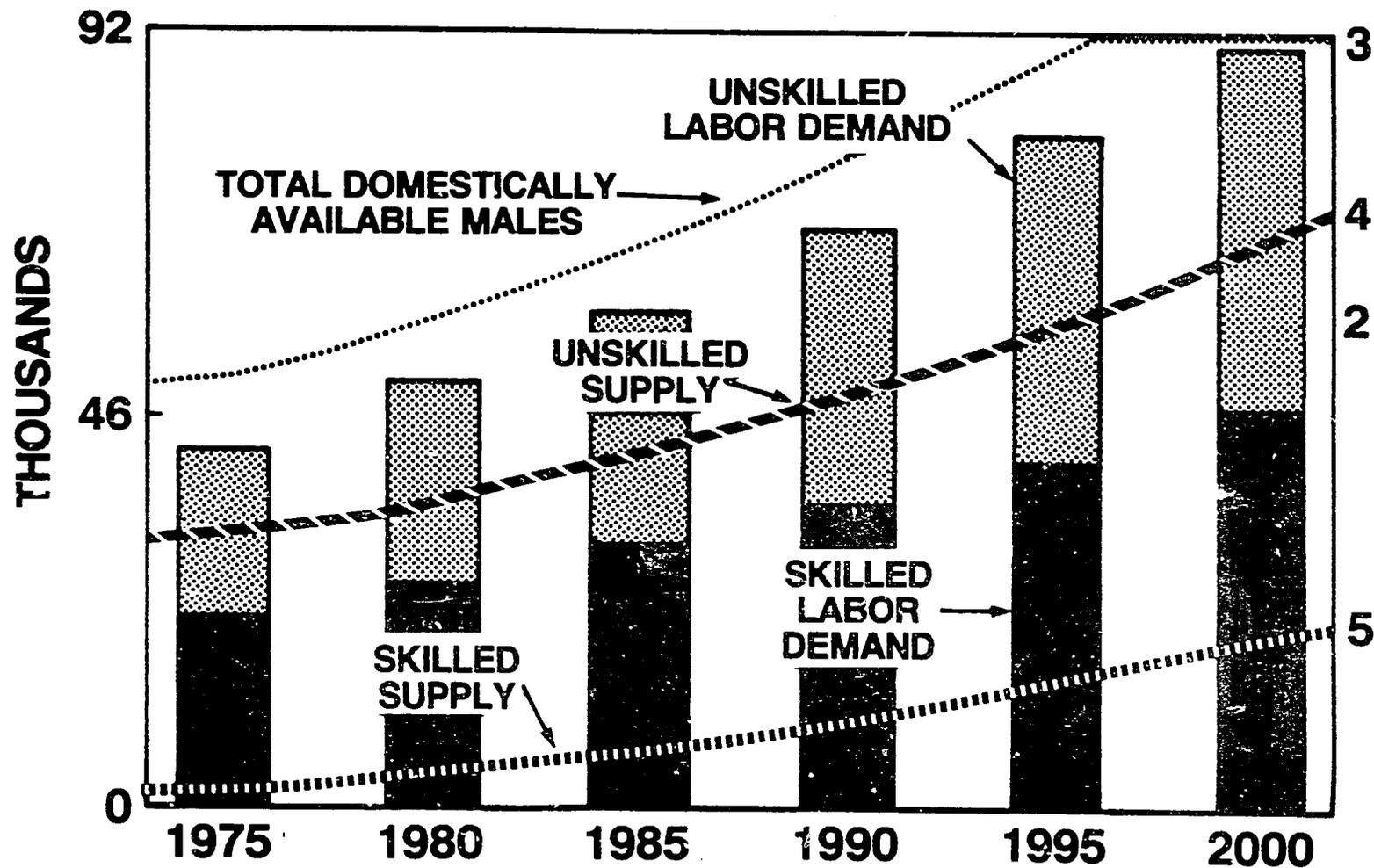
In three specific areas; agriculture, education, and health care it has been shown that the resources of female labor can be used to increase productive potential and reduce the outflow of foreign exchange. To conclude, let's examine how female labor might contribute to the modern sector labor supply overall.

On this series of displays we're going to look at the demand and supply for unskilled and skilled labor in Yemen to the year 2000. First, shown in the dotted bars, is the annual demand for unskilled laborers in the years 1975, 1980, 1985, 1990, 1995, and 2000. This, in effect, is the annual number of new unskilled jobs to be filled. The solid bars in front of the dotted bars are the annual demand for skilled laborers in the same manner.

The dotted line number 3 represents the total number of primary aged males that remain in the country. This represents the labor pool from which we can draw our laborers. However, not all of these men are available.

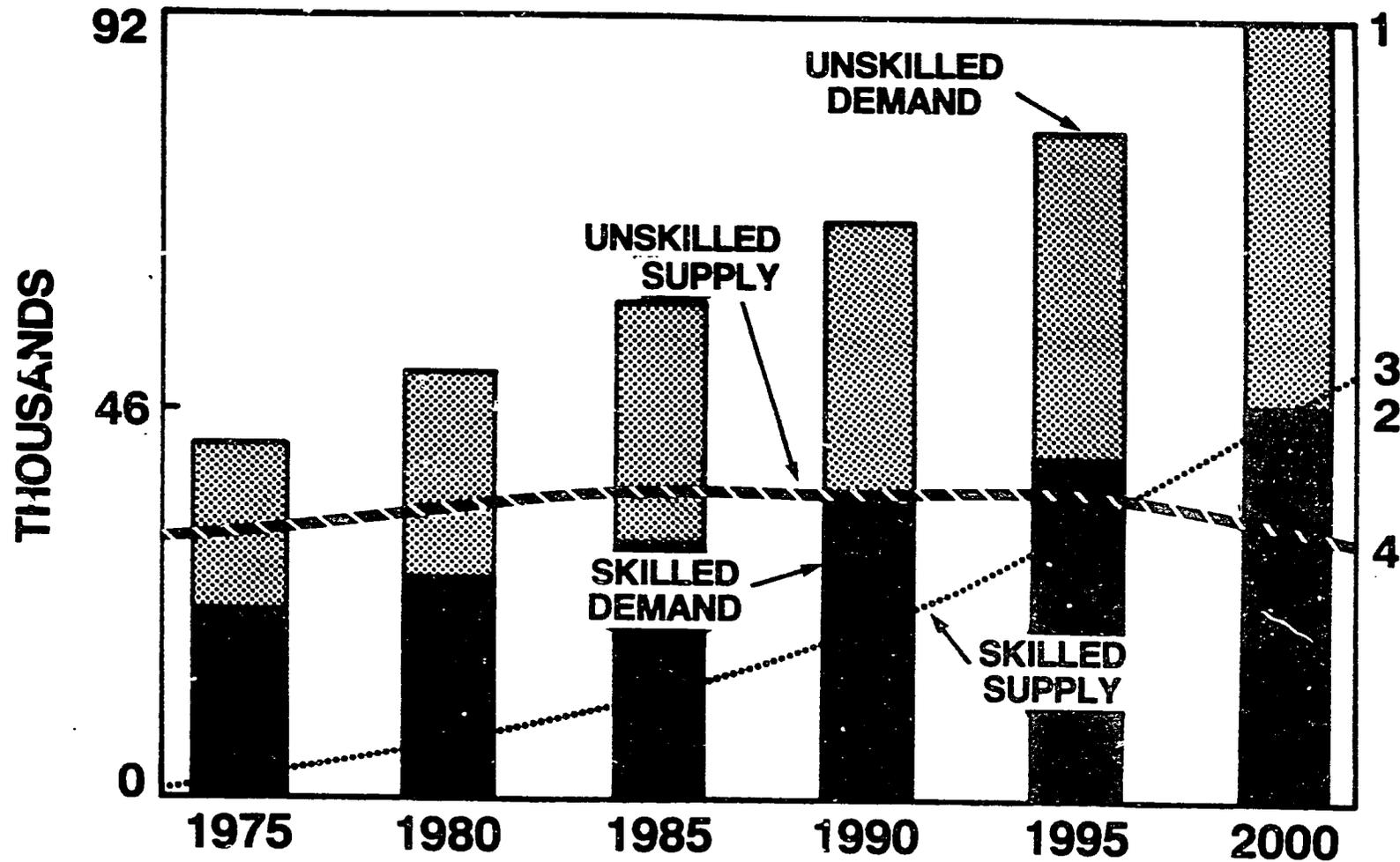
The other two lines represent the number of available unskilled (diagonal dashed line number 4) and skilled (small dashed line number 5) workers. The unskilled workers are estimated by the number of primary school graduates that do not continue into preparatory and secondary school. The skilled workers are represented by the number of secondary school graduates. It is important to remember that people who become skilled workers are no longer available as unskilled workers. The next display will demonstrate this interrelationship.

ANNUAL LABOR REQUIREMENT AND SUPPLY



In this display, shown by the new line number 3, we have assumed that in order to meet the requirement for skilled workers we have increased preparatory and secondary school enrollments. In fact, a secondary school enrollment of 70 percent would be required in the year 2000 to do this. However, as shown in line number 4, when the number of secondary school enrollees is increased, the number of unskilled workers available is reduced by the same amount. This is because we are working with a fixed labor pool that is very nearly the same size as our unskilled labor requirement.

ANNUAL LABOR REQUIREMENT AND SUPPLY



On this one last display we can see how women might be used to ease this situation. Under the base condition, the enrollment rates for males were assumed to increase at the rate of 1 percentage point per year. On this display is shown what would happen if female enrollments were able to increase at the same rates

On the same labor supply and demand display we can see that the first thing that happens when we include women in the picture is that the available labor pool is completely off the scale. This is shown by the dotted line number 3 at the top of the page. The total labor pool has doubled, but since women don't emigrate, the available domestic labor pool has tripled.

With the assumed female enrollment rate increases it can be seen that you can meet both the demand for unskilled labor as shown by diagonal dashed line number 4 and the demand for skilled labor as shown by dashed line number 5. The labor pool is so significantly larger than previously that both can increase simultaneously.

As a final note of summary, it bears repeating that the keys to increasing the labor potential in Yemen were:

One, increasing the availability of female labor time through technological improvements such as village water supply and use of commercial fuels and,

Two, increasing the productivity of that time through basic education and agricultural extension.

ANNUAL LABOR REQUIREMENT AND SUPPLY

