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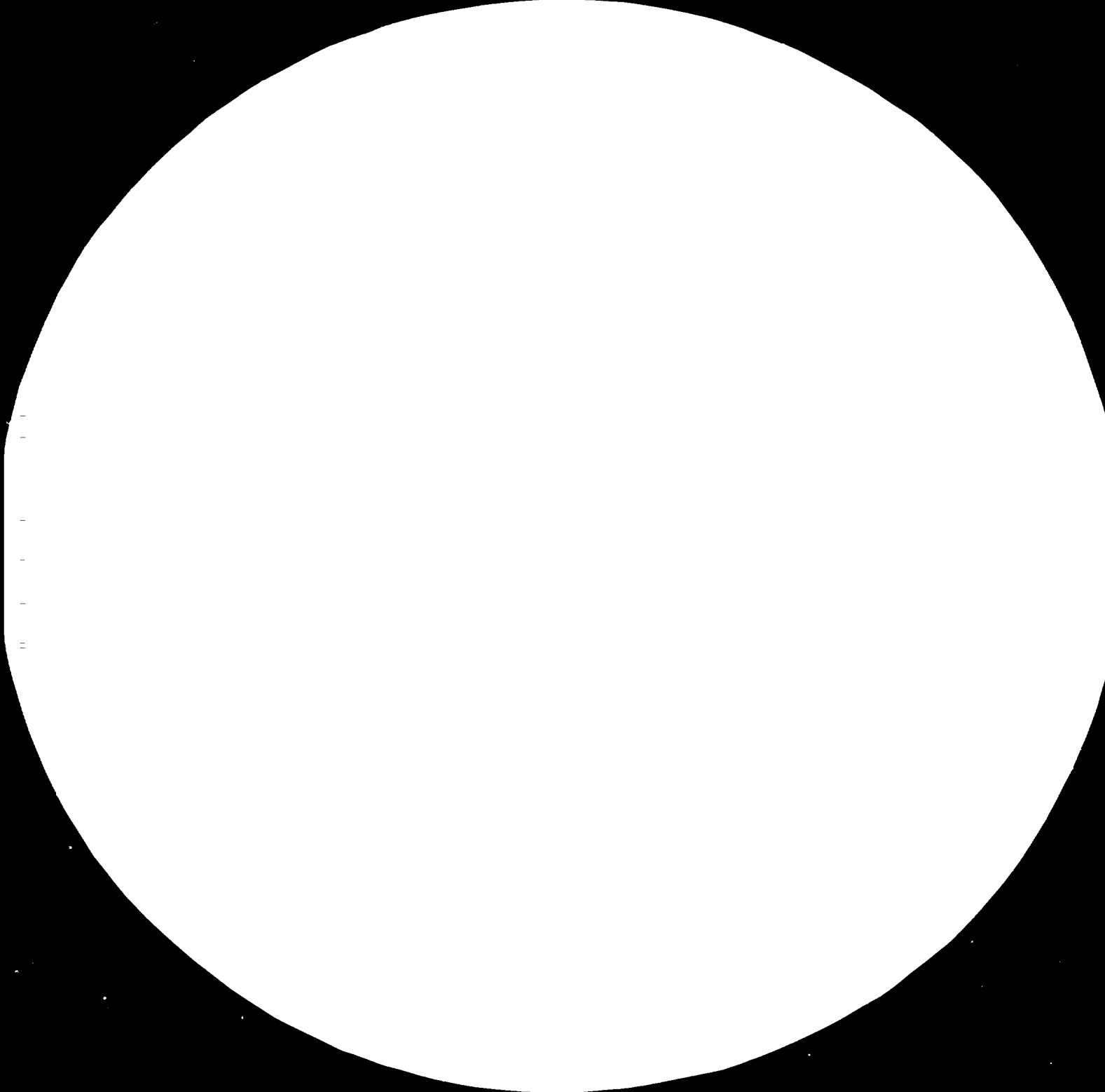
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Turkey. ESTABLISHMENT OF A CONDOM FACTORY .  
PF/TUR/80/001  
TURKEY .

Technical report: Manufacture and distribution  
of condoms .

Prepared for the Government of Turkey  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Messrs. Oato, Suzuki and Kashiwagi,  
pharmaceutical experts

United Nations Industrial Development Organization  
Vienna

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### Explanatory notes

References to dollars (\$) are to United States dollars.

The monetary unit of Turkey is the Turkish lira (LT). An exchange rate of LT 100 = \$1 has been used in this report.

A slash between dates (1974/75) indicates a crop year or financial year.

Use of a hyphen between dates (1972-1975) indicates the full period involved, including the beginning and end years.

A full stop (.) is used to indicate decimals.

A comma (,) is used to distinguish thousands and millions, except in tables.

The following forms have been used in tables:

A dash (-) indicates that the amount is nil or negligible.

A blank indicates that the item is not applicable.

A minus sign before a figure (-2) denotes a deficit or decrease, except as indicated.

Totals may not add precisely because of rounding.

The following abbreviations of technical terms and organizations have been used in this report:

FPAT	Family Planning Association of Turkey
GDPP	General Directorate of Population Planning
GNDP	gross national domestic product
GNP	gross national product
IPPF	International Planned Parenthood Federation
IUD	intra-uterine device
MCH	mother and child health
SPO	State Planning Organization
UNFPA	United Nations Fund for Population Activities

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ABSTRACT

In August 1979 the Ministry of Health, General Directorate of Population Planning, Turkey, asked the United Nations Industrial Development Organization (UNIDO) for technical assistance in preparing a feasibility study on the establishment of a condom manufacturing plant in Turkey.

UNIDO, as executing agency for the project "Establishment of a condom factory" (PF/TUR/80/001), provided three experts for one month in February/March 1981 at a cost of \$16,900 provided by the United Nations Fund for Population Activities (UNFPA).

The feasibility study determines the quality and quantity of condoms used and needed in Turkey, the chemicals and raw materials required for manufacturing purposes, marketing and distribution, the best location of the proposed factory, and includes a list of materials and equipment needed for production.

The experts recommend that UNFPA arrange finance for the investment costs as well as the first three years of operation, entailing a United Nations funding of approximately \$13 million. They propose, too, that the United Nations should fund the importation of condoms for one year while the plant is under construction.

The study was undertaken with the help of the persons listed in the annex.



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## INTRODUCTION

A high population in a country is often associated with poverty. In fact, many densely populated countries struggled with social and economic problems caused by high population rates.

The Government of Turkey has noted the population increase since 1960, but the rate of increase has remained despite efforts to control it in the past 20 years. Turkey has also suffered from an economic slump during this period.

In the late 1970s, Turkey began a project to manufacture condoms as a means of solving the population problem, with the help of commercial firms. The Government later gave permission to the Red Crescent to implement the project. The demand for condoms in Turkey gave impetus to this decision.

The Government of Turkey contacted the United Nations Fund for Population Activities (UNFPA) and requested their assistance. In responding, UNFPA asked the United Nations Industrial Development Organization (UNIDO) to send a mission to Turkey to prepare a feasibility study of establishing a condom plant.

Meanwhile, the General Directorate of Population Planning in Turkey's Ministry of Health agreed that the Family Planning Association of Turkey should take part in the project along with the Turkish Red Crescent Society.

In accordance with the request from UNFPA, UNIDO, as executing agency for the project "Establishment of a condom factory" (PF/TUR/80/001), provided three experts for one month in February/March 1981, who prepared the following:

- (a) A study on population problems and family planning activities;
- (b) A study on condom distribution and potential demand;
- (c) A projection of the size of a condom plant, the estimated investment needed and the required running cost;
- (d) A description of the necessary machinery and equipment;
- (e) An outline of the management personnel needed.

As a result of the limited time for the investigation and a lack of certain information, there is neither a detailed programme for condom distribution nor a quantitative analysis of the effect of establishing a condom plant on the Turkish economy, health and population.

## I. DEMOGRAPHIC BACKGROUND

### Population and the rate of increase

The first census of the Turkish population was carried out in 1927, after the Republic of Turkey was established. Censuses have since been conducted every five years from 1935 (see table 1).

The rate of increase was relatively low until after the Second World War due to worsening health, nutrition and general living conditions. The growth rate then rose rapidly until the 1960s when an estimated 1.5 million Turkish people left to work outside the country. The rate of increase since the 1960s has declined but the fall is still inadequate from a demographic point of view.

Table 1. Population and the rate of increase in Turkey, 1927-1980

Year	Population (Millions)	Rate of increase <sup>a/</sup> (%)
1927	13.6	2.2
1935	16.1	2.0
1940	17.8	1.1
1945	18.8	2.2
1950	21.0	2.8
1955	24.1	2.9
1960	27.8	2.5
1965	31.4	2.6
1970	35.6	2.5
1975	40.3	1.7
1976	41.0	2.5
1977	42.1	2.5
1978	43.1	2.5
1979	44.2	2.2
1980	45.2	

Source: Ministry of Health.

<sup>a/</sup> The figures from 1927-1975 are shown as the average annual rate of increase in each five-year period.

Birth and mortality rates

A significant fall in the mortality rate has been attributed to an improvement of the standard of living over the past 25 years. However, the birth rate is still high although there is a tendency to decline (see table 2). If emigration were ignored, there would be no doubt that the natural rate of increase would have remained at around 2.6 per 100, and there has been no significant change in this trend since the 1950s. (According to the latest information from the Ministry of Health, a birth and mortality rate in the period 1975-1980 could have been 3.2 and 1.0 respectively per 100.)

It is anticipated that a further fall in the mortality rate will be seen in the future. Therefore, an abrupt decrease in the birth rate is necessary so that the natural rate of increase can be reduced.

This is a sign of improved social awareness. It is believed that the mortality rate influences the birth rate; a decrease in the mortality rate would lower the birth rate after a specific time-lag.

Table 2. Birth and mortality rates  
(Percentage)

Period	Birth rate	Mortality rate	Natural population growth rate
1951-1955	46.7	21.1	25.6
1956-1960	45.2	17.9	27.3
1961-1965	41.3	15.3	26.0
1966-1970	40.8	13.5	27.3
1971-1975	37.5	12.1	25.4

Source: State Institute of Statistics, Third and Fourth Five-Year Development Plans.

Distribution of population

The population structure of Turkey is young and dynamic (see table 3 and figure I). A large proportion of the population has a high fertility rate and is quite predominant; men and women in the 15-44 age group constitute 42.8 per cent of the total population.

Table 3. Distribution of population in Turkey by age and sex, 1975

Age group	Male	Female
<4	2 757 051	2 646 241
5-9	2 786 944	2 659 548
10-14	2 727 087	2 498 802
15-19	2 317 818	2 162 873
20-24	1 836 590	1 515 714
25-29	1 453 487	1 394 732
30-34	1 093 224	1 099 066
35-39	1 035 174	1 140 912
40-44	1 095 622	1 066 108
45-49	904 177	826 001
50-54	654 831	645 964
55-59	388 724	392 447
60-64	517 458	552 891
65-69	356 252	371 384
70-74	264 028	298 816
75	228 733	308 967
<b>Total</b>	<b>20 417 200</b>	<b>19 580 466</b>

Source: General Directorate of Population Planning, Annual Report, 1979.



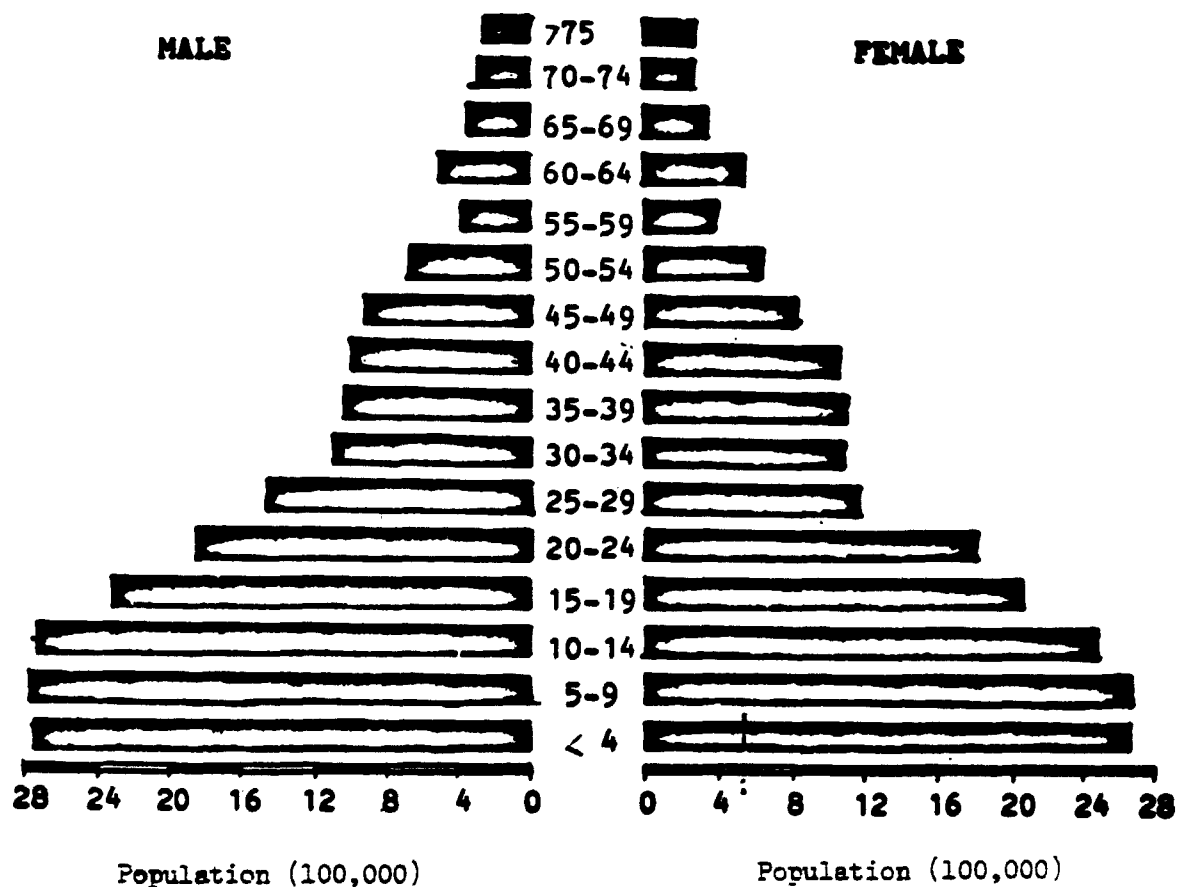


Figure I. Population pyramid in Turkey, 1975

In addition, about 40 per cent of women have not yet reached their reproductive age; this is symbolized by a long base in the population pyramid.

The Turkish population as a whole will rapidly increase over the next two decades even though the birth rate is slowing down.

Population density and the urban population

No serious distortion is observed in Turkey as far as the population density is concerned, except for an unbalanced population increase in the urban areas. This is often the case in many metropolitan areas in the world (see tables 4 and 5).

Table 4. Population density in Turkey, 1927-1975

Year	1927	1935	1940	1945	1950	1955	1960	1965	1970	1975
Density per km <sup>2</sup>	18	21	23	24	27	31	36	41	45	52

Source: State Institute of Statistics, 1927-1975 censuses

Table 5. Rural and urban population of Turkey, 1927-1983

Year	Rural		Urban <sup>a/</sup>	
	Number	Per cent	Number	Per cent
1927	11 409 945	83.6	2 238 316	16.7
1935	13 475 787	83.4	2 682 231	16.6
1940	14 612 769	82.0	3 207 681	18.0
1945	15 351 572	81.7	3 438 602	18.3
1950	17 071 958	81.5	3 875 230	18.5
1955	18 746 450	77.9	5 318 313	22.1
1960	20 455 302	73.7	7 299 518	26.3
1965	22 006 087	70.1	9 386 334	29.9
1970	22 822 918	64.1	12 782 258	35.9
1975	23 033 320	57.3	17 164 340	42.7
1980 <sup>b/</sup>	22 455 000	50.0	22 455 000	50.0
1983 <sup>b/</sup>	20 191 080	42.0	27 882 920	58.0

Source: State Planning Organization.

<sup>a/</sup> Population residing in places with 10,000 or more population.

<sup>b/</sup> 1980 and 1983 projections are from the Fourth Five-Year Development Plan.

Table 6 shows the distribution of the urban population according to the size of the city. Population increases of large cities are much faster than those of smaller cities. The abrupt increase in population brings about various problems which are often seen in many other metropolitan areas in the world. For example, in Ankara, the population increased from 122,720 in 1935 to 1,698,542 in 1975. As a result, 60 per cent of the people live in slums since the supply of labour is beyond the level of demand.

Table 6. Distribution of the urban population by city size, 1927-1985  
(Percentage)

Size	1927	1940	1950	1960	1970	1975	1985
10,000-20,000	24.0	23.8	22.9	15.8	14.3	12.4	10.0
20,000-50,000	28.9	28.7	23.2	21.9	20.5	31.4}	12.7
50,000-100,000	9.3	12.2	10.1	17.0	11.1		12.0
>100,000	37.8	35.3	43.8	45.3	54.1	56.2	65.2

Source: Keles Rusen, "Socio-economic and political aspects of urbanization in Turkey", unpublished paper, and 1975 census of population.

Note: 1985 figures are provisional projections by the Ministry of Reconstruction and Resettlement.

The future population

In the year 2000, the population of Turkey will reach 66.9 million (see table 7). However, according to the Ministry of Health (see table 1), the population in 1980 already exceeds 45 million, which is close to the "high fertility" alternative (see table 8). Therefore, a great effort is needed to achieve the "plan alternative". (see figure II.)

Even if the population does not reach the 80 million mark in the year 2000, it may reach over 70 million unless a drastic change occurs in the coming 15 years.

The population below 20 years of age exceeds 50 per cent and will become reproductive. An abrupt fall in the birth rate is not expected for at least another 15 years. On the contrary, the birth rate may increase if nothing is done with regard to family planning.

Table 7. Future demographic ratios  
(Per thousand)

Demographic ratios	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
<u>Birth rate</u>					
Plan alternative	32.2	31.6	29.5	25.8	22.1
High fertility	34.9	36.8	37.0	36.1	35.1
Medium fertility	32.0	31.5	29.7	26.8	24.0
Low fertility	20.3	28.5	25.8	22.6	19.1
<u>Death rate</u>					
Plan alternative	10.0	8.9	7.8	7.7	5.9
High fertility	10.3	9.3	8.1	6.8	5.7
Medium fertility	10.0	8.9	8.1	6.7	5.9
Low fertility	9.9	8.7	7.7	6.7	6.1

Natural population growth rate

Plan alternative	22.2	22.7	21.6	19.1	16.2
High fertility	24.6	27.5	28.9	29.3	29.3
Medium fertility	21.9	22.5	21.9	20.1	18.1
Low fertility	20.4	19.8	18.1	15.8	13.0

Source: State Planning Organization, Fourth Five-Year Development Plan estimates, 1979.

Table 8. Future population of Turkey  
(Millions)

Alternative	1975	1980	1985	1990	1995	2000
Plan alternative	40.2	44.9	50.3	56.1	61.8	66.9
High fertility	40.2	45.5	52.1	60.2	69.7	80.7
Medium fertility	40.2	44.9	50.2	56.0	61.9	67.8
Low fertility	40.2	44.5	49.1	53.8	58.2	62.2

Source: State Planning Organization, Fourth Five-year Development Plan estimates, 1979.

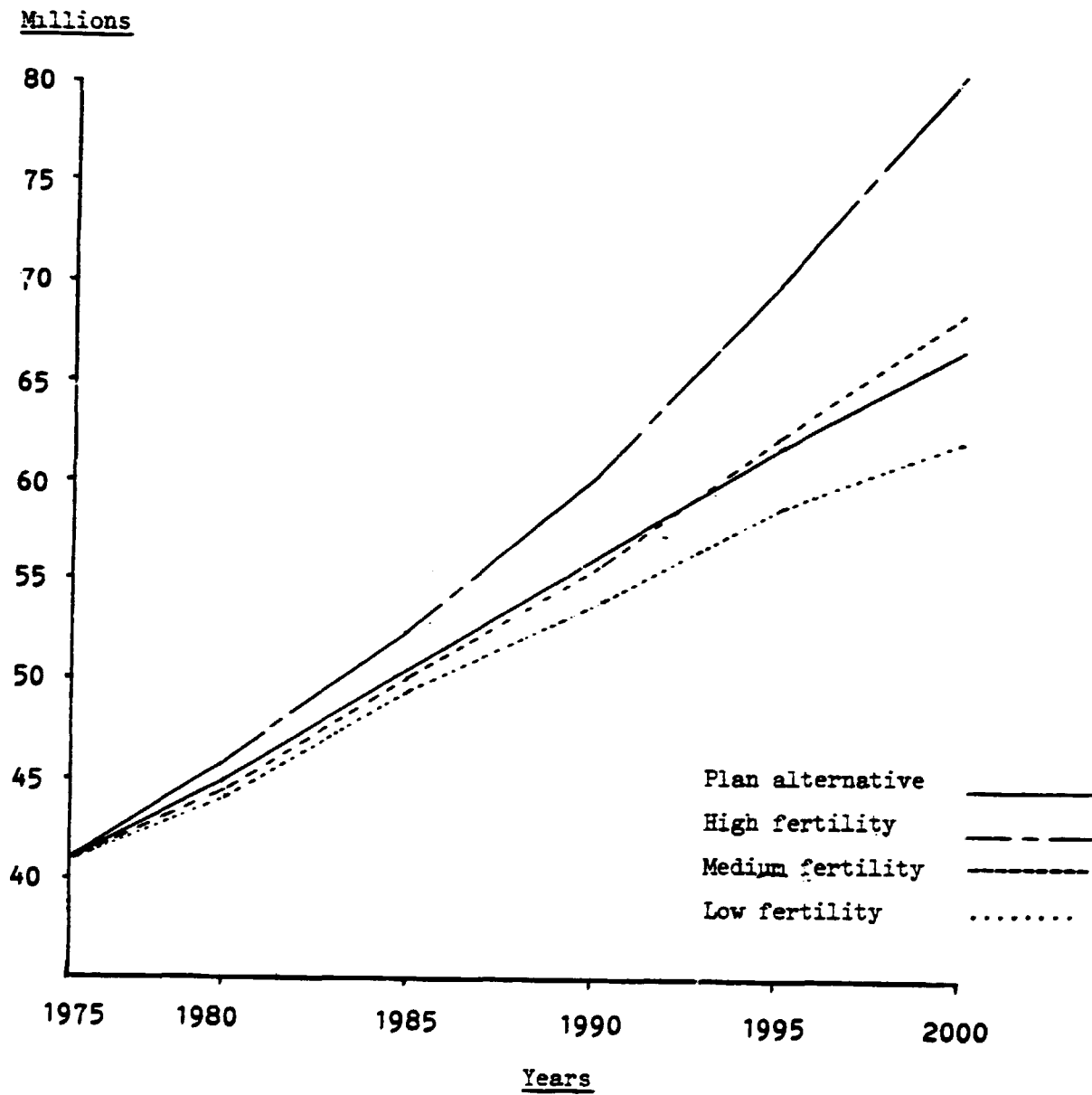


Figure II. Future population of Turkey

## II. POPULATION PROBLEMS

Since Malthus <sup>1/</sup> there has been controversy among economists about the influence of population increases on the national economy.

### Per capita income and its effect on population

In any discussion on national economic growth, attention must be centred on real growth rather than nominal change. Otherwise, the data will only consist of the enumeration of figures. In this respect, factor costs and the rate of population increase indicate the real economic growth of the country.<sup>2/</sup>

Significant changes both in commodity prices and the size of the population have been observed in the past few years.

As clearly shown in table 9, inflation in Turkey is extraordinarily serious. In recent years the rate of price increases has been incredibly high (see table 10).

Table 9. Price indices in Ankara and Istanbul  
(Percentage changes over the previous year)

Month	Wholesale price			Cost of living, Ankara		Cost of living, Istanbul	
	General	Food	Industry	General	Food	General	Food
<u>1979</u>							
January	4.7	5.9	3.0	3.7	2.3	2.3	0.6
February	9.8	11.2	7.4	7.4	15.0	4.6	2.9
March	15.3	15.5	15.2	11.4	18.0	7.2	6.3
April	24.4	18.3	32.9	18.9	23.9	12.7	10.6
May	30.2	23.6	39.4	23.0	27.5	17.7	13.8
June	39.6	29.8	53.3	27.6	33.5	30.4	28.4
July	44.2	35.0	57.1	35.6	38.8	41.7	36.8
August	48.9	40.0	61.5	45.7	45.6	47.6	39.6
September	53.4	42.4	68.9	49.7	47.3	54.5	44.1
October	61.3	47.6	80.4	55.1	51.4	65.1	57.0
November	74.0	58.0	96.6	62.5	57.5	73.7	64.8
December	81.4	65.7	103.4	71.7	67.4	81.8	73.7

<sup>1/</sup> T.R. Malthus, "An essay on the principle of population, as it affects the future improvement of society".

<sup>2/</sup> The effect of devaluation on the Turkish lira is ignored in this report.

Table 9 (continued)

Month	Wholesale price			Cost of living, Ankara		Cost of living, Istanbul	
	General	Food	Industry	General	Food	General	Food
<u>1980</u>							
January	9.2	10.8	7.4	10.2	17.7	10.4	13.6
February	41.9	38.0	44.8	24.5	31.7	25.1	25.3
March	47.5	48.2	46.5	39.7	50.1	29.8	30.2
April	52.7	47.7	58.4	50.8	62.7	34.8	34.5
May	57.2	54.3	60.4	55.6	68.3	38.8	38.7
June	61.5	59.0	63.9	61.6	77.8	44.4	45.8
July	61.8	58.0	66.1	64.3	79.6	47.5	46.9
August	64.3	62.9	65.8	68.3	84.8	52.8	51.2
September	69.9	72.7	67.0	71.4	89.9	58.6	57.5
October	82.0	77.3	76.0	77.3	98.7	65.9	63.1
November	88.9	94.8	82.1	81.7	105.8	68.3	64.2
December	94.7	105.2	82.6	86.6	108.9	75.1	71.9

Source: State Planning Organization, Turkey, Main Economic Indicators, 1979-1981.

Table 10. Consumer price indices, Ankara and Istanbul  
(1968 = 100)

City	1975	1976	1977	1978	1979
Ankara	251.3	289.7	372.1	556.3	870.8
Istanbul	237.6	278.8	354.3	514.8	816.9

Source: Lloyds Bank report.

As table 10 shows, it took almost 10 years to triple prices in the period 1968-1978, but they almost doubled again in 1978-1979. The high rate has persisted and is being maintained. Therefore, nominal GNP figures are insufficient to evaluate the Turkish economy.

In observing the nominal and the real gross national product (GNP) in Turkey, table 11 shows the gross national product (GNP) at current and 1968 prices.

Table 11. Gross national product, 1978-1980  
(Million LT)

Year	At current prices (nominal)		At 1968 prices (real)	
	GNP	Rate of increase (%)	GNP	Rate of increase (%)
1978	1 288 662.4		209 059.1	
		+69.04		+0.74
1979	2 178 367.4		210 596.8	
		+80.73		-2.17
1980 <sup>a/</sup>	3 936 964.2		206 030.3	

Source: State Planning Organization.

a/ Estimate.

The growth of the real GNP was 0.74 per cent in 1978-1979 and -2.17 per cent in 1979-1980, while the nominal GNP increased by 69.04 per cent and 80.73 per cent, respectively. However, about 2 per cent of a population rate increase affects the per capita income significantly.

According to the calculation <sup>3/</sup> real per capita GNP in Turkey decreased by 1.8 per cent during the 1978-1979 period and it fell again by another 4.3 per cent in the next year, 1980.

<sup>3/</sup> In calculating the growth rate of real per capita GNP. It is assumed:

G = GNP, P = Population, therefore

$$G = P \cdot \frac{G}{P}$$

0 : year 1st  
1 : year 2nd

$$g = \text{growth rate of GNP} = \frac{G_1 - G_0}{G_0}$$

$$p = \text{growth rate of population} = \frac{P_1 - P_0}{P_0}$$

Then, growth rate of per capita GNP =

$$\frac{\left(\frac{G_1}{P_1}\right) - \left(\frac{G_0}{P_0}\right)}{\left(\frac{G_0}{P_0}\right)}$$

From tables 1 and 11, 1978-1979 period:

$$\frac{\frac{210,596.8}{44.2} - \frac{209,059.1}{43.1}}{\frac{209,059.1}{43.1}} = -0.0175$$

1979-1980 period:

$$\frac{\frac{206,030.3}{45.2} - \frac{210,596.8}{44.2}}{\frac{210,596.8}{44.2}} = -0.0429$$

Note: Approximately speaking,  $g = p +$  (growth rates of per capita income). If  $g$  is zero (unchanged) as  $p$  increases by  $x$  per cent, growth rate of per capita income reduces by  $x$  per cent.



The undesirable situation in the Turkish economy caused by a high inflation rate has been accelerated by a high population increase. The increase in population by x per cent will lower the standard of living by x per cent, under the conditions of no growth in the economy. In fact, the standard of living in Turkey has fallen by 5.94 per cent as a result of an increase in population in the period 1978-1980.

#### Unemployment

In 1977, 13.5 per cent of the labour force in Turkey were unemployed and the high unemployment rate is still showing an upward trend. According to recent estimates, the unemployment rate is now above 20 per cent.

However, the question is whether an increased rate of growth of the population is responsible for the unemployment problem.

In the 1920s, there was controversy between Beveridge and Keynes about causality between population and unemployment.<sup>4/</sup> Later, according to Carr-Saunders,<sup>5/</sup> who analysed the problem, over-population is not reflected in a high unemployment rate but in a lower per capita income (it induces a lower standard of living). In this respect, a high rate of unemployment should not lead to a high growth of population. Other factors such as a lack of capital, technology and resources can be responsible for the economic situation except in the case of a sudden population increase in a particular city.

#### Dependency ratio

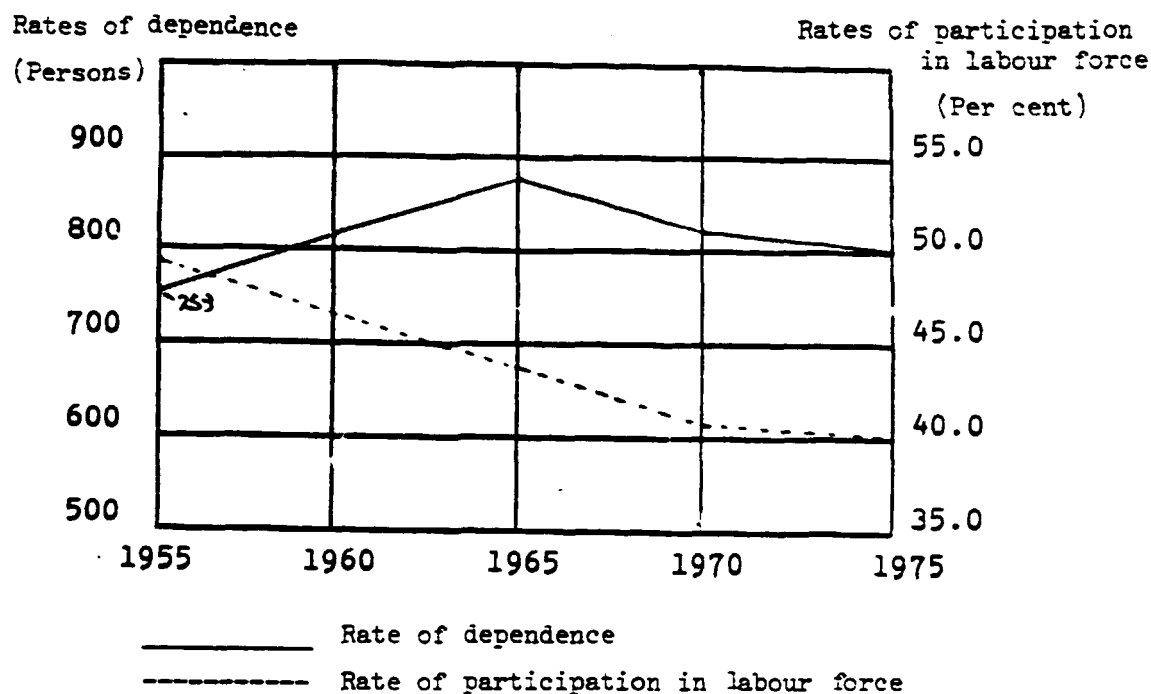
In Turkey, the under-14-year-olds constitute a large proportion of the total population. As a result, the dependency ratio is quite high (see figure III).

While 100 active persons in 1955 were needed to feed 753 persons besides themselves, the figure rose to 808 by 1975. However, there has been a reduction in the number of those joining the labour force (43.4 per cent in 1965 compared to 40.7 per cent in 1975).

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<sup>4/</sup> W.H. Beveridge, "Population and unemployment". J.M. Keynes, "A reply to Sir William Beveridge".

<sup>5/</sup> A.M. Carr-Saunders, "Population".



Source: General Directorate of Population Planning.

Figure III. Dependency ratio and labour force participation rate

#### Demographic investment

A population increase makes it necessary to allocate some proportion of the national budget to demographic investment. At the same time the Government of Turkey faces the problem of raising capital for industrialization.

Capital is required for building schools, hospitals and other welfare facilities. Such expenses may prove to be a heavy burden on the Turkish economy and will delay industrialization.

In this respect, demographic investment is costly for a country which is struggling against an economic slump. In addition, capital spent on demographic problems is not expected to bring immediate results.

During Turkey's third five-Year Plan (1973-1978), the number of middle-level schools was increased by 51.1 per cent; however, the target set for the schooling ratio could not be reached as the number of students increased by only 18.3 per cent.

#### Housing

An increasing number of couples are unable to afford to own their own houses. In the larger cities, the housing problem is becoming serious due to the high population density and inflated costs for building for rental purposes (for example, see tables 12 and 13).

Table 12. Indices of housing costs for wage earners in Istanbul

Item	December 1979	December 1980	Per cent change	
			1980/1979	1979/1978
House furniture	3 419.8	4 891.3	+43.0	+156.9
House rent	2 403.8	2 792.9	+16.2	+78.3

Source: Istanbul Chamber of Commerce.

Table 13. Indices of housing costs for wage earners in Ankara  
(1968 = 100)

Item	1975	1976	1977	1978	1979
Housing (unfurnished)	172.5	178.5	191.8	293.3	439.7
Housing (furnished)	266.2	325.7	434.6	738.5	1 199.3

Source: Ankara Chamber of Commerce.

#### Food

The growing domestic demand for livestock is not being met and is well below its potential productivity level. In view of the rapidly shrinking agricultural labour force, the still low level of agricultural productivity gives cause for serious concern.

#### Health

Table 14 shows the number of doctors, nurses and midwives in Turkey. It is estimated that one doctor per 7,000 of the population is required in rural areas, and one doctor per 4,000 in urban areas, to meet the need. The actual number of practising physicians is more than twice this figure, i.e. 25,230.

Table 14. Medical personnel

Year	Doctors	Nurses	Midwives
1962	9 000 (0.31/1 000)	1 600 (0.05/1 000)	3 700 (0.13/1 000)
1971	15 800 (0.43/1 000)	9 800 (0.24/1 000)	11 300 (0.31/1 000)
1975	21 714 (0.54/1 000)	14 806 (0.37/1 000)	12 975 (0.32/1 000)
1978	25 230 (0.58/1 000)	20 966 (0.49/1 000)	16 219 (0.38/1 000)

Source: State Institute of Statistics.

However, the problem is not the number but the distribution. Approximately half the doctors are concentrated in the cities; about two thirds of all doctors are in Istanbul, Ankara and Izmir. The doctor/population ratio reaches a high of 1/450 in the metropolitan areas. On the other hand, this rate may drop as low as 1/15,000 or even lower in the most deprived rural areas. This is one of the major problems of urbanization in Turkey.

#### Abortion

Abortion is one of the most conspicuous of the population problems in Turkey.

Induced abortion is illegal except in cases where the life or health of the mother would be endangered by the continuation of pregnancy, or where there is a great likelihood of severe malformation or retardation of the child. <sup>6/</sup> Accurate data on the incidence of induced abortion is therefore difficult to obtain. According to unofficial sources the figure is estimated at from 220,000-500,000 per year (30 abortions per 100 women). Induced abortion is believed to account for a large proportion of maternal deaths, and it is estimated that deaths by abortion account for 50 per cent of maternal mortality. <sup>7/</sup>

An increased availability of reliable contraceptive methods and education in their proper use may be partial solutions to the problem. It may also be appropriate to consider whether a less strict law relating to induced abortion is needed.

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<sup>6/</sup> Over 1,000 abortions are made each year at Ankara Maternity Hospital.

<sup>7/</sup> Maternal mortality: It is estimated that a maternal death rate is near 15 per 10,000 according to Hacettepe doctors.

### III. POSSIBLE CAUSES OF POPULATION INCREASE

#### Low mortality rate

A significant drop in the mortality rate and a relatively slow decline in the birth rate results in an increased population growth.

This situation applies in Turkey. Improvement in sanitation, nutrition and living conditions and progress in medical services, which lower the mortality rate, can be expected and will require a rapid decrease in the birth rate.

#### Age structure

If the age structure of a country is biased towards the younger generation, it will be difficult for the birth rate to fall.

One consequence of the high birth rate in Turkey is the young age structure. As the future population of Turkey is predicted to rise, a natural decrease in the birth rate cannot be expected.

#### Dependency on agriculture

When a country is dependent upon its agricultural rather than on its industrial sector, a high birth rate is anticipated. Agriculture tends to be labour-intensive compared to industry. A couple earning a living from agriculture tends to have more children than a couple who work in a factory. They can survive unemployment as long as they are self-sufficient and can feed their family with their own crops. As a result, the cost of raising a family is a determining factor in deciding upon the number of children.

Agriculture in Turkey is still an important sector, employing over 60 per cent of the labour force and accounting for approximately 65 per cent of exports (see tables 15 and 16). Its importance to the economy is declining, however as Turkey undergoes a process of industrialization. Agriculture's share of the GNDP was 38 per cent in 1963 but had fallen to 24 per cent by 1980. (see table 17).

Table 15. Distribution of population (12 years and over)  
by economic activities, 1977

Activity	Percentage
Agriculture, forestry, hunting and fishing	64.1
Mining and quarrying	0.7
Manufacturing	7.6
Electricity, gas and water	0.1
Construction	2.7
Wholesale and retail trade, restaurants and hotels	5.0
Transport, storage and communications	3.1
Financing, insurance, real-estate and business services	1.1
Community, social and personal services	11.4
Other activities	<u>4.1</u>
Total	100

Source: State Institute of Statistics, Statistical Yearbook of Turkey, 1977.

Table 16. Exports of major goods in Turkey  
(Millions of dollars)

Goods	1977	1978	January-June 1979
Agricultural products	1 041.1	1 543.1	695.8
Of which: cotton	213.6	352.8	179.2
hazelnuts	251.1	330.8	155.8
tobacco	175.9	225.3	116.1
cereals and pulses	128.5	267.5	94.8
Industrial products	586.0	621.2	405.2
Mining and quarrying products	125.9	123.9	77.8
Of which: chrome	45.5	24.6	13.9
Total: all exports	<u>1 753.0</u>	<u>2 288.2</u>	<u>1 178.8</u>

Source: Lloyds Bank report, London.

Table 17. Distribution of GNDP in three sectors  
(Percentage)

Year	Agriculture	Industry	Service
1963	38.1	15.6	46.3
1964	36.4	16.6	47.0
1965	34.1	17.8	48.1
1966	33.8	18.3	47.9
1967	32.5	19.0	48.5
1968	30.7	20.0	49.3
1969	29.3	21.0	49.7
1970	28.5	20.2	51.3
1971	29.6	20.2	50.2
1972	27.8	20.9	51.3
1973	24.0	22.4	53.6
1974	24.3	22.3	53.4
1975	24.8	22.3	52.9
1976	24.6	22.6	52.8
1977	23.0	24.1	52.9
1978	22.7	24.1	53.2
1979	23.2	23.0	53.8
1980 (estimated)	24.0	20.6	55.4

Source: State Institute of Statistics.

Turkey retains the economic structure of an agricultural country, and this is the main cause of its high birth rate. Table 18 shows that a Turkish family which makes its livelihood from agriculture tends to have a large number of children. Of married women on farms, 50.9 per cent have more than five children, compared with less than 20 per cent of women who make a living from industry. The more Turkey industrializes in the future, the lower the birth rate will be.

Table 18. Occupations of women and number of children ever-born  
(Percentage)

Occupation	Number of children						Total
	0	1	2	3	4	5	
No work	11.3	14.6	18.9	16.4	11.4	27.4	100.0
Family farm	7.1	7.8	10.8	11.6	11.8	50.9	100.0
Other farming	4.9	4.9	9.8	16.2	15.2	49.1	100.0
Services	14.5	21.1	29.5	11.5	7.5	15.9	100.0
Industry	9.6	11.0	23.9	21.5	16.7	17.2	100.0

Source: Hacettepe University Institute of Population Studies.

#### Early marriage

If a women marries at a young age she will have a greater chance to have more children than a women who marries later.

The minimum legal age for marriage in Turkey is 18 years for both men and women. However, the law permits marriage after the age of 14 years with the agreement of the parents and the courts. According to a survey in 1977, the average marriage age was 17.9 years for women, which is at least five to seven years earlier than the comparable age for marriage, according to statistics, in developed countries (see table 19).

As a result, 12.8 per cent of women under 20 years of age already have more than two childrer (see table 20).

If the marriageable age of women were delayed, it would affect fertility to some degree.

#### Infant mortality

High infant mortality leads to more children being born. In order for couples to achieve their desired number of children they have more children.

As shown in table 21, the infant mortality rate has decreased from 1948-1972. However, it remains high, although the theory that a low infant mortality has a favourable effect on fertility cannot be proved.



Table 19. Distribution of all ever-married women according to age at first marriage -  
by current age. Classified by region and type of place  
(Percentage)

Place	Age at first marriage													Mean
	<15	15	16	17	18	19	20	21	22	23	24	25-29	>30	
Total	16.3	12.3	15.3	13.4	12.3	8.6	7.4	5.0	3.1	2.2	1.5	2.1	0.5	17.9
Urban	12.7	10.6	14.6	12.6	12.4	9.1	8.7	6.2	3.7	3.1	2.4	3.0	0.9	18.5
Rural	19.9	14.1	15.9	14.3	12.2	8.1	6.2	3.7	2.4	1.2	0.6	1.2	0.2	17.3

Source: Hacettepe Institute of Population Studies, Turkish Fertility Survey 1978.

Table 20. Distribution of ever-married women according to the  
number of children ever-born - by current age  
(Percentage)

Current age	Number of children ever-born					
	0	1	2	3	4	>5
<20	49.3	38.0	9.6	2.9	0.3	0.0
20-24	16.4	27.7	28.6	17.4	6.7	3.2
25-29	6.1	12.1	25.5	20.2	17.5	18.5
30-34	4.1	4.8	14.8	18.9	15.2	42.1
35-39	2.0	2.8	9.2	13.2	13.4	59.4
40-44	2.9	1.6	7.5	11.0	12.4	64.5
≥45	2.4	1.8	7.8	9.4	10.8	67.4
Total	9.6	11.9	16.3	14.6	11.8	35.6

Table 21. Infant mortality rates in Turkey, 1948-1972

Year	Per thousand
1948-1952	237
1953-1957	200
1958-1962	164
1963-1967	139
1968-1972	106

Source: Ergin Ayse, Estimation of Infant Mortality Trends from Pregnancy Histories (Ankara, 1975).

Ignorance of family planning

It has been observed that young couples in developing countries have a lack of knowledge about family planning. As a result, they are upset when an unplanned pregnancy occurs. The most important feature of family planning is not avoiding pregnancy, however, but to control family size by using knowledge of family planning.

Table 22 indicates the number of women who know something about contraception.

Table 22. Knowledge about contraceptive methods <sup>a/</sup>  
(Percentage)

Age	Knows no method	Knows only inefficient method	Knows efficient method
<20	14.2	2.3	83.5
20-24	11.5	1.8	86.7
25-29	8.2	1.8	90.0
30-34	8.8	1.3	89.9
35-39	11.0	2.6	86.3
40-44	15.5	2.5	82.0
>44	<u>16.1</u>	<u>3.0</u>	<u>80.9</u>
Total	11.7	2.1	86.2

Source: Hacettepe University Institute of Population Studies.

<sup>a/</sup> Efficient methods include: the Pill, intra-uterine device (IUD), other female scientific methods, condom, injection, male and female sterilization. Inefficient methods include: douche, rhythm, withdrawal and abstinence.

It has been found that Turkish people have at least a relatively high level of knowledge about contraception, although how well they know about it cannot be determined.

Table 23 shows the distribution of currently married women according to the total number of children wanted and table 24 shows the distribution of all ever-married women according to the number of living children.

Table 23. Distribution of currently married women according to total number of children wanted by current age (Percentage)

Age	Number of living children					
	0	1	2	3	4	5
<20	0.3	3.1	48.9	26.5	14.8	6.4
20-24	0.8	4.0	44.4	29.1	16.8	4.9
25-29	0.5	1.9	42.7	32.2	15.8	6.8
30-34	0.8	1.6	35.9	34.2	17.7	9.8
35-39	0.9	2.3	38.2	30.4	15.4	12.9
40-44	1.0	1.3	38.2	29.0	19.0	11.6
>45	0.3	2.1	32.5	34.0	20.1	11.2
Total	0.7	2.3	40.2	31.0	17.0	8.8

Source: Hacettepe University Institute of Population Studies.

Table 24. Distribution of all ever-married women according to number of living children by current age (Percentage)

Age	Number of living children					
	0	1	2	3	4	5
<20	54.2	37.4	7.0	1.4	0	0
20-24	18.7	33.2	31.8	12.0	3.2	1.1
25-29	7.5	15.0	31.2	23.7	14.4	8.2
30-34	4.1	7.9	19.9	25.4	17.3	25.0
35-39	2.6	4.3	12.9	21.7	17.9	40.5
40-44	3.4	4.3	11.3	16.4	20.1	44.5
>45	3.0	2.6	10.4	18.7	17.5	47.7
Total	0.8	14.6	20.1	18.2	13.2	23.2

Source: Hacettepe University Institute of Population Studies.

When both tables 23 and 24 are compared it is found that only 8.8 per cent of married women want more than five children, while 23.2 per cent of married women have had more than five. This indicates that undesirable children have been born in many cases.

This illustrates the gap between the high level of knowledge about contraception in Turkey and the reality of women bearing more children than wanted. This can possibly be explained as follows:

(a) People might only know the names of contraceptive methods, but might not know how to use them since they have not been given sufficient information about family planning. It is believed they do not know which ones are efficient. On the whole they receive inadequate information about contraception;

(b) It is likely that there is a shortage of contraceptives and people often take the risk of pregnancy;

(c) It is probable that there also exists an inadequate contraceptive distribution system so that people do not know how to obtain supplies;

(d) Because of the high price of contraceptive, users may be obliged to take the risk of pregnancy.

#### Effects of religion and politics

Religious beliefs often restrict the use of contraceptives. Legal restrictions on contraception or political encouragement of high fertility may also give impetus to an increase in population.

In the 1975 census over 99 per cent of the population indicated that they were Muslims. No detailed study focusing on the attitudes of the Muslim majority towards major population issues, especially of the Muslims in the rural areas, has been undertaken. There seems to be no religious objection to the use of contraceptives.

The population policy of the Republic of Turkey was pro-natalist until 1965, but has since become more liberal except in connection with induced abortion.

As a result, it was found that there is no social pressure with regard to the use of contraception in Turkey.

#### IV. FAMILY PLANNING IN TURKEY

##### Government policy

Since the establishment of the Republic of Turkey in 1923, it was the general belief that Turkey's main need was to increase its population because of the loss of lives during the First World War and in the War of Independence, as well as the high levels of infant mortality. Until the late 1950s, this belief was not seriously questioned, until public debate began on abortion problems. A dispute concerning pro-natalism then started.

The argument for a change in government policy was made in the first five-year development plan (1963-1967) on the basis that Turkey would probably suffer, not from a scarcity, but from an excess of manpower in the near future, and slowing down the increase in population was desirable.

In 1963, with law no. 557 concerning population planning, a new policy was adopted. This asserted the principle that individuals should have the right to have the number of children they wished and to have them when they wanted them.

This law brought about the following changes in Turkish population policy:

- (a) Laws which prohibited the spread of knowledge about contraceptives and the import and sale of contraceptives were repealed;
- (b) The Ministry of Health was given the task of supplying free or low-cost contraceptive assistance to those who wanted it, and of providing free information about family planning;
- (c) Laws and policies promoting high fertility were repealed. However, tax allowances for up to five children remained in force and subsidies for each school-age child were paid to state employees. The amounts involved were probably insufficient to encourage higher fertility;
- (d) It was agreed that population planning education would be given to personnel (doctors, nurses, midwives, assistants, and health officials) employed by the Public Health Service;
- (e) It was decided to examine either the possibility of importing low-price contraceptives, or producing them in Turkey and distributing them to the needy without charge.

Another law was also passed in 1965 which set up the General Directorate of Population Planning (GDPP) within the Ministry of Health and Social Assistance.

##### The development of family planning

##### The Ministry of Health and GDPP

Planning in general is reserved for the State Planning Organization (SPO), however, in practice, concrete planning is done within the Ministry of Health since the SPO has only general policy objectives. The Ministry of Health is responsible for implementing laws and policies regarding family planning.

The sectors shown in the organization chart in figure IV and three other directorates are primarily concerned with providing services in the areas of general health, mother and child health (MCH) and family planning. These directorates are the Directorate of Socialization and the Directorate of Mother and Child Health, and the GDPP (see figure V). There is also a plan to integrate the population planning and MCH directorates, but at present, separation and lack of co-ordination persist.

The responsibilities of the GDPP as defined in its 1979 report are as follows:

- (a) To curb the population growth rate which is paving the way to serious problems from the economic, social and medical points of view. To this end, enlighten and inform the public that it is possible to prevent pregnancy if and when wanted. For this purpose the following activities will be carried out:
  - (i) Publishing news and feature articles on the subject in newspapers and magazines;
  - (ii) Disseminating propaganda material over radio and television;
  - (iii) Producing instructive and informative films;
  - (iv) Distributing brochures, magazines, books and posters;
  - (v) Holding lectures, seminars and public sessions;
  - (vi) Holding exhibitions;
  - (vii) Teaching the public with the help of trained health workers and mobile teams who will establish communication links with families. They will teach them that what the country and the family needs is not a large number of children which the family is incapable of feeding and raising but enough of them properly fed and raised;
- (b) To co-operate with military, official and voluntary organizations in the fields of education, training and implementation for the rendering of an efficient service;
- (c) To supply families with all the necessary drugs and devices in addition to information in connection with family planning; thus helping families avoid unwanted pregnancies and abortions, and to adopt measures with a view to enhancing the level of mother and child health;
- (d) To treat sterility.

#### Field organization

The field organization has been set up from a point of extending the Headquarters' activities to the field. They cover population planning out-patient clinics, maternity hospitals, hospitals, maternity clinics, mother and child health centres and health houses. They also perform clinical work with the help of mobile teams (see figures VI and VII).

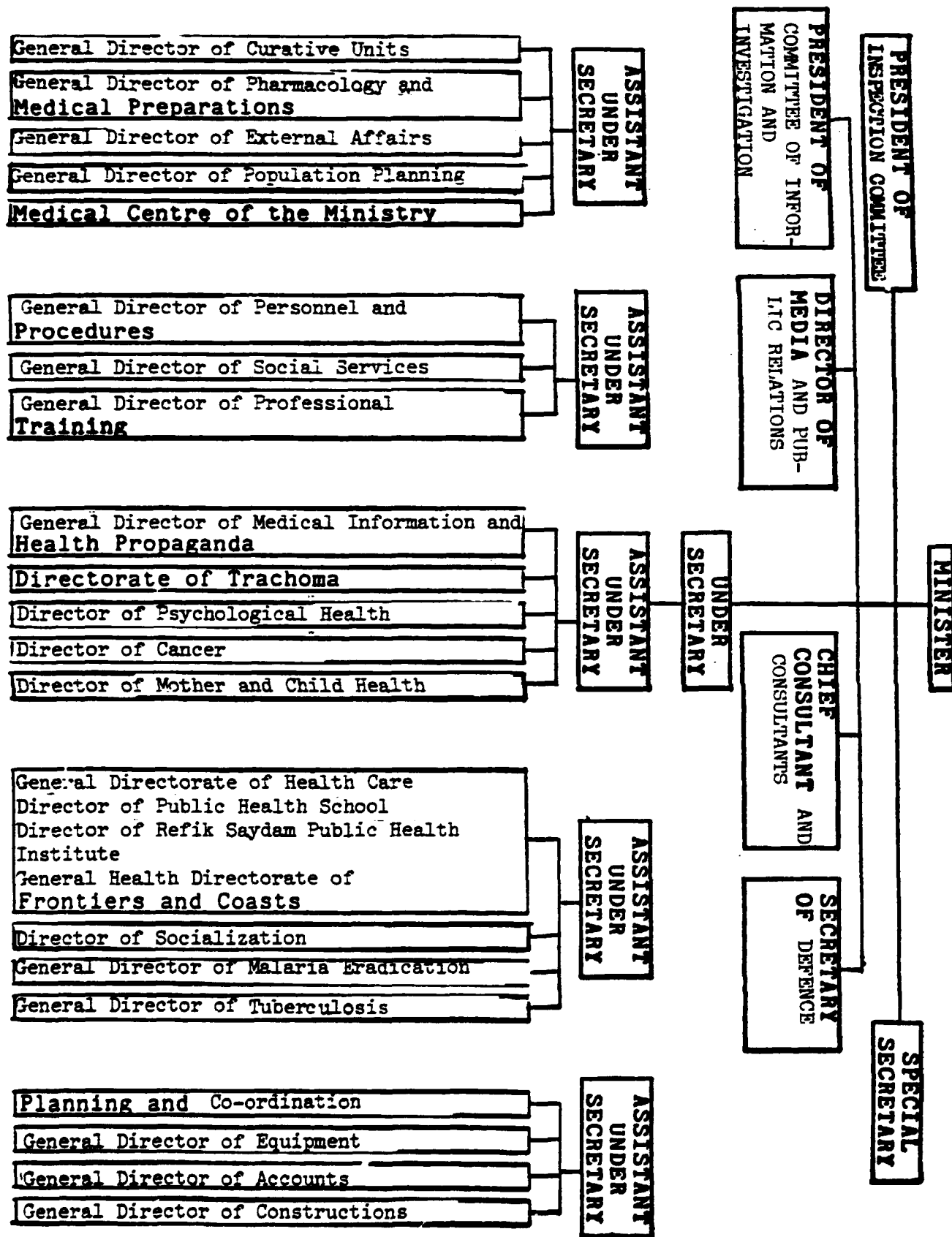


Figure IV. Ministry of Health and Social Assistance: organization chart

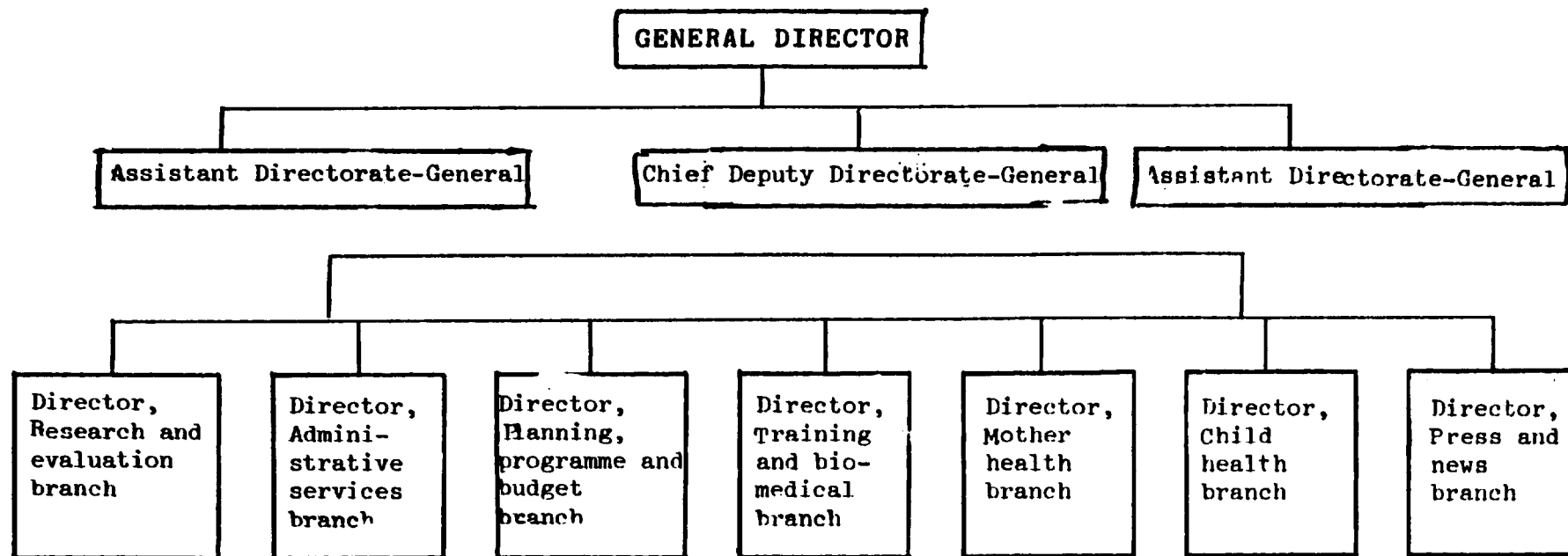


Figure V. Organization chart of Headquarters' organization of Directorate-General of Population Planning



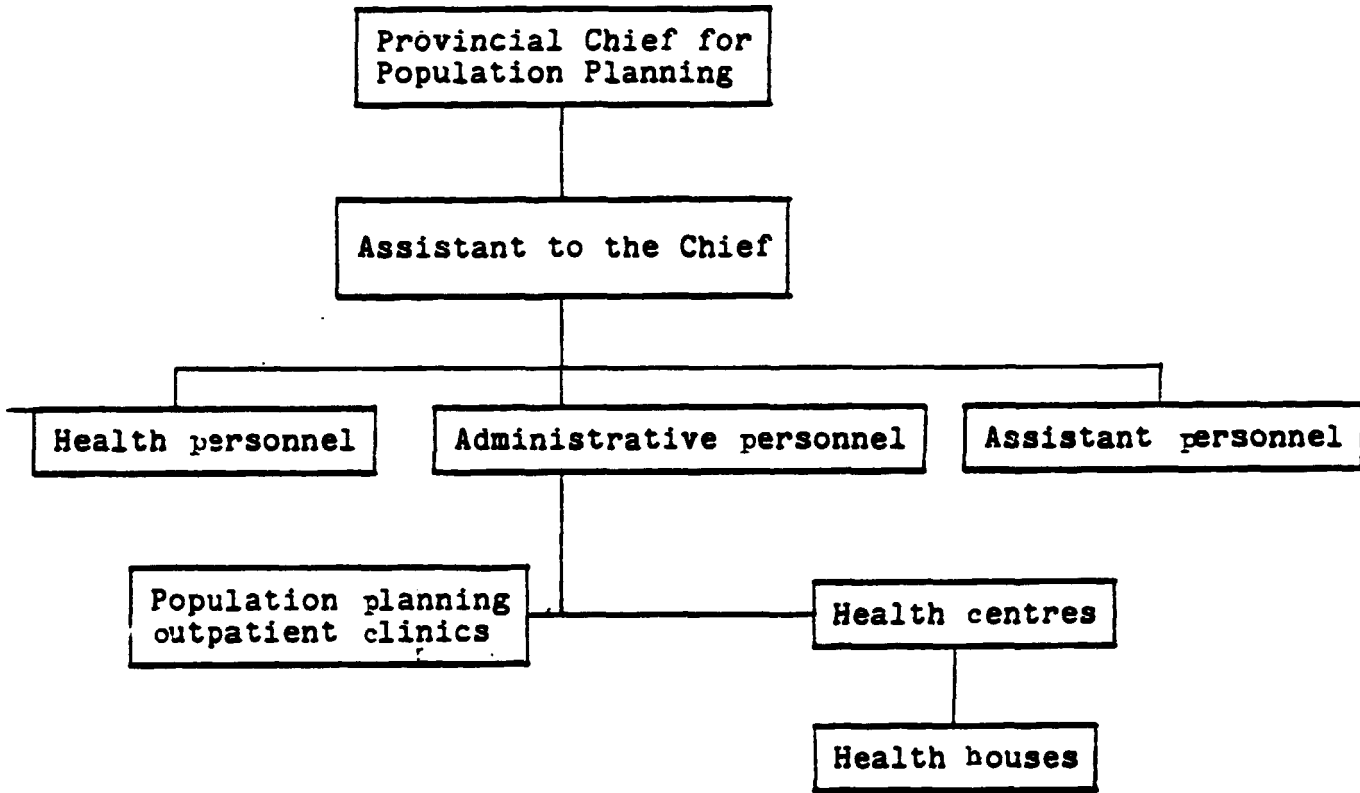


Figure VI. Field organization chart of Directorate-General of Population Planning (in provinces covered by socialization)

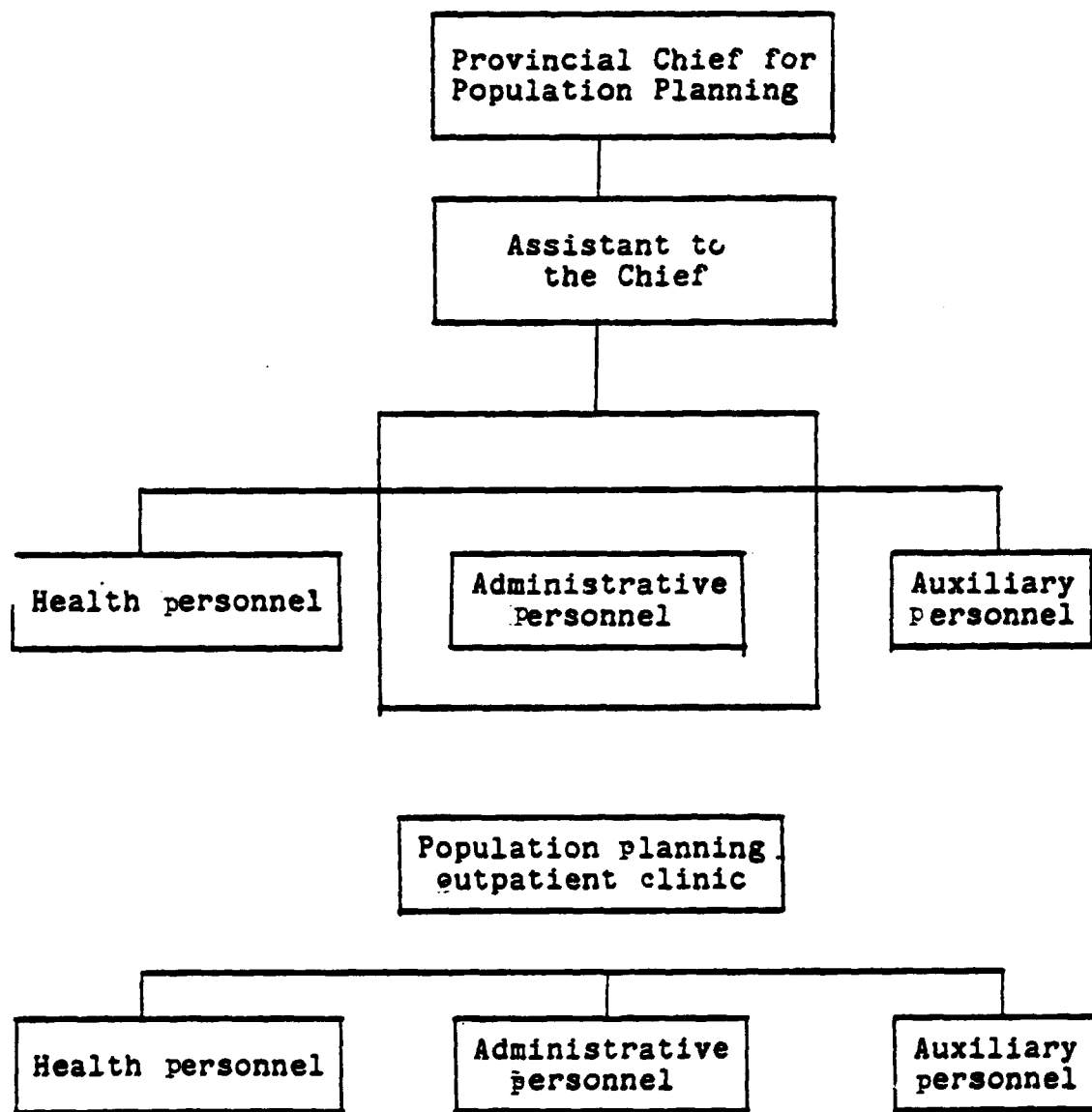


Figure VII. Field organization chart of Directorate-General of Population Planning (in provinces not covered by socialization)

Family planning services

Facilities

Family planning services under the auspices of the Ministry of Health are provided through clinics which are integrated into other health service facilities. There are about 600 such clinics and dispensaries operating through maternity hospitals, other state hospitals which have obstetrical services, mother and child health centres, health units and health houses.

A mobile team approach has been made from time to time, but the programme is operated only irregularly and desultorily.

Manpower

The existing manpower is below the expected level and this situation to some extent hampers the efficiency of the service. At the end of 1979 the cadres of both the provincial population planning chiefs and the population planning outpatient clinics were short by 75 per cent of the programmed personnel requirements (see table 25).

Table 25. Programmed and actual number of health personnel

Requirements	Top-level health personnel	Intermediary health personnel <sup>a/</sup>	Administrative and auxiliary service personnel <sup>a/</sup>	Total
Programmed	274	1 077	1 275	2 626
Actual	33	303	317	653
Shortage	-241 (-88.0%)	-774 (-71.9%)	-958 (-75.1%)	-1 973 (75.1%)

Source: GDPP.

<sup>a/</sup> Intermediary health personnel include midwives and nurses; auxiliary service personnel include typists, drivers and messengers.

At the health unit and health levels, the responsibility for distributing family planning information rests almost entirely with the midwives. In this respect it is recommended that field services are intensified by increasing the number of midwives.

A shortage of doctors is also noted, and this affects contraceptive programmes since only doctors are authorized to insert IUDs or to prescribe oral contraceptives. In rural areas it is becoming a serious problem to recruit sufficient doctors to staff the health centres and health stations; the present vacancy rate is about 60 per cent.

### Training of health personnel

The revised curriculum for the training of nurses and midwives will give more instruction and practice with regard to family planning activities. Currently employed midwives tend to be inadequately trained for such duties. It is reported that many young midwives complete their training without having carried out a delivery or having even witnessed a birth.

Medical schools and faculties have recently begun to place greater emphasis on training in family planning, and on community medicine in general.

It is recommended that family planning courses should cover not only practical training but also philosophical aspects of family planning. The most important factor should be to convey to couples the message contained in family planning.

### Education

According to GDPP, a total of 2,232,713 women and 684,832 men were educated in 1979 by means of house visits and group education throughout the country (see table 26).

Table 26. Family planning education, 1978-1979

Trained	1978	1979
Women	2 228 841	2 232 713
Men	718 388	684 832
Total	2 947 029	2 917 545

Source: GDPP.

At the secondary school level, girls take courses in child care and home economics as part of the prescribed curriculum. However, there has been no attempt to incorporate population planning concerns into existing health educational programmes.

Family planning clinics primarily provide contraceptive information, but there is no systematic programme of sex education for either adolescents or adults, married or unmarried, in any of the aspects of family planning.

There is a post-partum family planning programme in the MCH centres, health units, and health houses to identify post-partum cases and to offer contraceptive information, but this is not working efficiently.

Publications and information

Table 27 indicates the type of publications put out by GDPP on family planning.

Table 27. Distribution of publications by GDPP

Publications	1978	1979	1978-1979 (%)
Posters	17 045	5 792	-194
Brochures	57 200	40 240	-30
Books	2 500	4 555	82
Population Planning News Bulletin	-	10 000	100
Flip-book	-	41	100

Source: GDPP.

Educational slides and films have also been prepared and these audio-visual aids have been shown at fairs, health courses and seminars.

Regardless of the efforts of the GDPP, the publications have not generally reached mass audiences, and information on family planning is more likely to be spread by users and prospective users rather than by clinic staff. Both villages and urban town neighbourhoods generally have effective "grapevines" for the transmission of gossip as well as important information.

Radio and television have given relatively little coverage to family planning issues. Women's magazines are directed mainly to the urban middle class, and regularly feature articles on contraception, sex information and other related topics.

It is most likely that information about family planning services is spread by this means.

Budget

The problems of family planning activities such as the shortage of manpower and facilities, the deficiency of education and training may come from lack of an adequate budget. Table 28 shows the share of the Ministry of Health and Social Assistance from the national budget as well as the share earmarked from the Ministry's budget for the GDPP and MCH services during the past three years.

Table 28. National budget, budget of Ministry of Health and budget of GDPP and MCH (Millions of Turkish lira)

Year	National budget (A)	Budget of Ministry of Health (B)	B/A x 100	Budget of GDPP and MCH (C)	C/B x 100
1977	222 949	6 505	2.9%	47	0.7%
1978	262 753	7 895	3.0%	53	0.7%
1979	409 431	17 530	5.8%	58	0.3%

Source: GDPP.

While the share for the Ministry of Health from the national budget increased from 3 per cent to 5.8 per cent, the allocation of resources for GDPP and MCH from the budget of the Ministry of Health decreased in 1978-1979 from 0.7 per cent to 0.3 per cent.<sup>8/</sup> It is presumed that a greater part of the budget allocated to GDPP and MCH was spent on administrative expenses. Therefore, actual spending on activities may be small.

Besides the allocation from the national budget, GDPP has been allowed to make use of funds provided by UNFPA and other international organizations. However, without an increase in the allocation in the national budget for the family planning services, further development activities cannot be expected, even if external financial support is assured in the future.

#### Other organizations

##### United Nations Fund for Population Activities (UNFPA)

As a result of negotiations between the Ministry of Health and UNFPA, the executive committee of UNFPA in 1974 approved a grant of \$10 million over a period of five years to assist the spread of family planning services and for the development of a major programme in this field. Since then, in co-operation with organizations such as UNICEF and WHO, UNFPA has assisted family planning activities in Turkey. These activities include: family planning development in Ankara province, MCH/family planning services, known as Yozgat, communications support to the GDPP, fellowships, expansion of family planning services, population training in health and, manpower development, support to family planning activities in the peri-urban areas, adult education projects etc.

<sup>8/</sup> According to the Ministry of Health, 346 million LT is budgeted for GDPP and MCH in 1980.

World Health Organization (WHO)

The support of WHO includes research on the safety and effectiveness of the termination of pregnancy, development of new and improved intra-uterine devices, and health service research in family planning at Hacettepe University.

United Nations Children's Fund (UNICEF)

UNICEF has supported the development of national MCH services that may directly or indirectly involve family planning programmes.

The Pathfinder Fund

The Pathfinder Fund's support has been given for the development and field testing of village midwives in-service training courses for the delivery of family planning services. They have also provided financial support for a training project for midwife-nurses working with maternity hospitals.

Others

In addition, Turkey has also received assistance for family planning activities from the Federal Republic of Germany, the Family Planning International Assistance, the International Planned Parenthood Federation (IPPF), the Association for Voluntary Sterilization, the International Project, the International Statistical Institute and the World Fertility Survey as well as other organizations.

Not only further financial support from these agencies is required but also effective co-ordination with them is needed to develop family planning activities.

Contraception

There are a few administrative and operational problems with regard to family planning activities in Turkey.

Preferences

Many married women in Turkey have more children than they wish to have (see tables 23 and 24). A question arises as to what percentage of exposed <sup>2/</sup> women do not want any more children (see table 29).

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<sup>2/</sup> Exposed women means a fecund married woman.

Table 29. Currently married fecund women who want no more children -  
by number of living children (including any current pregnancy)  
(Percentage)

Age	Number of living children										Total
	0	1	2	3	4	5	6	7	8	>9	
<20	1.0	7.1	45.5	16.7	0	0	0	0	0	0	10.4
20-24	0	5.0	39.2	58.1	75.8	75.0	100	0	0	0	29.6
25-29	0	6.5	46.0	61.3	71.9	72.5	79.2	100	0	0	49.4
30-34	0	19.0	55.2	78.9	78.4	83.5	79.2	82.1	72.7	80.0	69.2
35-39	0	60.0	79.2	87.9	90.5	82.9	90.3	85.4	81.3	90.9	84.0
40-44	33.3	61.5	95.2	94.4	91.7	93.5	93.0	87.2	94.1	96.3	91.6
>45	0	50.0	90.9	96.9	94.9	96.9	84.2	80.0	82.4	92.9	90.4
Total	0.8	10.0	51.5	73.4	82.6	84.9	86.4	84.8	83.1	92.6	57.1

Source: Hacettepe University Institute of Population Studies.

More than 70 per cent of exposed women who have three children do not want to have any more children, and even in a group of exposed women who have had two children, over 50 per cent of them do not desire an additional child.

Therefore, it may be said that a high percentage of fecund women can be potential users of contraceptives if these are appropriately distributed.

Experience of contraception

Table 30 shows the distribution of currently married fecund women who ever used specified contraceptive methods.

Table 30. Distribution of currently married fecund women who ever used specified contraceptive methods, including sterilization - by current age  
(Percentage)

Method	<20	20-24	25-29	30-34	35-39	40-44	>45	Total
<u>Efficient</u>								
Pill	9.5	24.2	31.8	34.3	29.2	27.4	18.2	27.0
IUD	1.8	6.9	9.0	12.1	9.8	8.7	5.1	8.3
Condom	2.1	6.7	13.3	15.8	12.7	12.7	20.7	11.5
Other female scientific methods	0.3	1.1	1.3	1.6	1.8	1.4	1.0	1.3
Injection	0	0	0.1	0.2	0.4	0.7	0	0.2
Male sterilization	0	0	0	1.0	0.4	1.9	1.0	0.5



Table 30 (continued)

Method	<20	20-24	25-29	30-34	35-39	40-44	>45	Total
<u>Inefficient</u>								
Female sterilization	0.6	2.2	3.1	4.6	2.5	3.4	6.6	3.0
Douche	7.4	15.9	17.7	20.4	26.2	25.7	25.3	19.4
Rhythm	1.5	4.1	6.0	6.4	5.2	6.0	6.1	5.1
Withdrawal	13.6	30.2	34.7	41.2	40.3	42.3	34.8	34.6
Abstinence	0	1.3	1.1	1.1	1.6	1.0	1.5	1.1
Intra-uterine folk methods	1.5	6.0	9.8	12.6	8.0	8.7	7.6	8.2
Others	0	0.5	1.2	0.3	2.0	1.7	1.0	1.0
Used no method	76.0	49.4	37.8	32.6	32.4	28.6	35.9	40.9
Only inefficient methods	12.1	20.8	20.7	21.1	26.9	29.8	26.8	22.3
One + effective method	11.8	29.8	41.5	46.3	40.6	41.6	37.4	36.8

Source: Hacettepe University Institute of Population Studies.

In table 30 the most notable fact is the percentage of women who have only used inefficient contraceptive methods. More than one out of five exposed women have used such methods regardless of the risk of conception. The facts indicate the lack of knowledge about contraceptives although there must be another reason to explain the popularity of inefficient contraceptive methods. In this respect, see also table 31.

Table 31. Distribution of ever-married women who have heard of specified contraceptive methods including sterilization - by current age

Method	<20	20-24	25-29	30-34	35-39	40-44	>35	Total
<u>Efficient</u>								
Pill	77.7	82.1	86.4	84.8	81.1	75.3	72.1	80.8
IUD	53.9	66.6	73.8	75.4	71.4	66.4	61.8	68.5
Condom	38.3	50.2	58.0	57.6	51.2	48.3	48.4	51.6
Other female scientific methods	27.3	29.6	32.5	36.4	32.1	30.1	30.7	31.6
Injection	7.2	5.9	8.0	6.0	5.0	5.4	4.6	6.1
Male sterilization	8.7	7.9	11.3	10.1	9.2	8.3	7.6	9.2
Female sterilization	33.0	37.0	45.4	43.7	37.4	37.8	34.7	39.2

Table 31 (continued)

Methods	<20	20-24	25-29	30-34	35-39	40-44	>35	Total
<u>Inefficient</u>								
Douche	37.1	47.6	52.0	53.4	51.9	49.8	45.6	49.2
Rhythm	18.3	23.1	26.0	27.0	22.2	21.8	20.7	23.3
Withdrawal	52.5	67.0	72.9	70.4	66.0	61.4	57.0	65.4
Abstinence	10.4	10.7	10.4	8.9	11.6	10.1	10.6	10.4
Intra-uterine folk methods	15.1	23.1	29.3	28.4	23.9	18.3	20.3	23.6
Others	2.9	3.5	4.5	4.0	5.9	4.1	5.0	4.3

Source: Hacettepe University Institute of Population Studies.

Current users

Table 32 shows the contraceptive methods which are currently used in Turkey. The figures emphasize the fact that many women still use traditional and inefficient contraceptive methods. (Withdrawal is the most popular means of birth control.)

Among the efficient methods, oral contraceptive pills, condoms and IUDs are the major devices. National family planning authorities have recommended and promoted the spread of these three methods.

Table 32. Distribution of exposed women according to use of specified contraceptive methods (including sterilization) - by current age (Percentage)

A. Using efficient methods

Age	Female			Condom	Other female scientific methods	Injection	Male		Total
	Pill	IUD	sterilization				sterilization		
<25	8.3	4.0	0	2.1	0.2	0	0	14.7	
25-34	10.3	5.1	0.4	4.6	0.3	0.2	0.5	21.3	
35-44	5.9	3.0	0.6	4.7	0.7	0.5	1.1	16.6	
>45	4.1	1.5	0.5	6.1	0.5	0	1.0	13.8	
Total	8.1	4.0	0.4	4.1	0.4	0.2	0.6	17.7	

B. Using inefficient methods

Age	Douche	Rhythm	Withdrawal	Abstinence	Intra-uterine folk methods	Others	Total
<25	3.4	1.1	14.8	0	2.0	0.2	21.7
25-34	4.3	1.8	23.9	0.1	4.3	0.2	34.5
35-44	8.3	1.0	26.1	0.1	2.4	0.7	38.6
>45	11.2	0.5	24.0	0	2.0	0	37.9
Total	5.7	1.3	22.2	0.1	3.0	0.3	32.5

Source: Hacettepe University Institute of Population Studies, 1978 Report.

Condoms, Pills, IUDs and other contraceptives

The Government of Turkey has distributed three major forms of contraceptives: Pills, IUDs and condoms. Doctors only are allowed to prescribe oral contraceptives and to insert IUDs, mainly in hospitals, clinics and other health facilities.<sup>10/</sup>

Table 33 shows the quantity of contraceptives distributed to outpatient clinics by the General Directorate of Population Planning during 1978-1979.

Table 33. Distribution of contraceptives to outpatient clinics by GDPP

Contraceptive	1978	1979	Rate of increase (%)
IUDs (units)	148 850	131 450	-11
Pills (packages) <sup>a/</sup>	171 300	1 459 974	752
Condoms (cartons) <sup>a/</sup>	1 365	16 689	1 123

Source: GDPP, Report, 1979.

a/ One package contains 28 pills. One carton contains 144 condoms.

It is estimated from table 32 that the number of exposed women is 7.15 million; the number of users of the three major contraceptives can therefore be estimated as 1.1 million.

<sup>10/</sup> 26 Pills are taken by one women each month. One gross of condoms is used yearly per couple. The IUD is effective for two years.

The difference between these two estimates is believed to be because of:

- (a) The existence of the private sector. Pills and condoms are freely available in drugstores and pharmacies;
- (b) Misreporting due to a shortage of staff;
- (c) Table 32 shows only the distribution through GDPP.

There is at present only one domestic manufacture of IUDs in Istanbul. However, production has ceased due to difficulty in the production of spirals and this has meant a decrease in the distribution of IUDs in 1979 compared with 1978. All other contraceptives are imported from overseas.

Other contraceptives such as vaginal tablets, foams and jellies have been also introduced, but the extent of the supply is not large.

## V. CONDOM MANUFACTURING

### Advantages of condoms

The advantages of condoms compared to other contraceptives are described below:

#### Production

(a) The technology for condom production is simple, but experience is required for the production of high quality condoms since the raw material, i.e. natural rubber latex, can easily be spoiled;

(b) The factory does not have to reach good manufacturing practices (GMP) standards, so the complicated registration procedures with the Ministry of Health do not need to be applied as is the case with the production of Pills and IUDs;

(c) Dipping technology can be used for the manufacture of other rubber goods such as gloves, finger stalls, balloons etc.;

(d) Investment for the plant is relatively small.

#### Use of condoms

(a) The use of condoms is simple and does not require a prescription from a doctor as is the case with the Pill and the IUD;

(b) A condom can be used when needed. In the case of the Pill, a woman must take them regularly, regardless of whether she has sexual intercourse or not.

#### Harmful effects

There are no side effects. In recent years, the safety aspect of the Pill and IUD has been questioned.

#### Preference and knowledge

(a) More than 50 per cent of adults in Turkey know about condom usage;

(b) Some couples find the use of a condom stimulating and refreshing. When the technology develops, coloured, shaped and surface treated condoms can be produced. Sexual interest would possibly be extended.

#### Cost

Generally speaking, the retail price of condoms is lower than other major contraceptives, though this depends on a doctor's fees for inserting an IUD and for prescribing the pill.

#### Risk of pregnancy

As long as controlled production is assured, the condom is one of the safest means of avoiding pregnancy. Complaints with regard to the Pill such as "I forgot to take it", or in respect of the IUD such as "it comes out" are often reported.

Availability

Condoms are available in pharmacies etc. without a doctor's prescription.

Export

After domestic supply has been satisfied, the excess supply can be exported since there are less than 20 manufacturers of condoms in the rest of the world. World demand is increasing rapidly.

Volume of production

Assumptions

- (a) Condom production and distribution will begin in 1983;
- (b) The population will be based on the 1975 census;
- (c) The annual rate of population increase is expected to be 2.5 per cent;
- (d) The number of fecund married women between 15 and 44 years of age is assumed to be 76.9 per cent of the total of fertile women (from the 1978 figures supplied by the Hacettepe University Institute of Population Studies);
- (e) Distribution of population by age is ignored;
- (f) Future condom users shall be divided into two groups. The first group of actual users, who use condoms without any incentive. The rate in 1983 shall be fixed at 4.1 per cent of fertile women (see table 32). The other group of potential users will be turned into actual users by promotion of family planning programmes organized by the Ministry of Health;
- (g) Currently, 32.5 per cent of all fertile women practise birth control by inefficient methods such as the douche, rhythm and withdrawal. Among users of efficient methods, 23.2 per cent of them have adopted the condom (see table 32). Therefore, we assume that 7.5 per cent of fertile women will be potential condom users ( $0.325 \times 0.232$ );
- (h) One gross (144) of condoms annually will be needed for each couple.

In preparing an estimate of the number of condoms needed the following facts have been taken into account:

- (a) Total female population in 1983: 10.2 million;
- (b) Total number of fertile married women in 1983: 7.84 million (see (d) and (e) above);
- (c) Actual condom users in 1983: 320,000 (see (f) above);
- (d) Potential condom users in 1983: 588,000 (see (g) above).

Therefore, the total condom volume established as needed in 1983 would be in the region of 908,000 gross (320,000 + 588,000).

However, 908,000 gross is the maximum expected demand in 1983 and will be subject to fluctuation depending on the efficiency of family planning activities. The quantity should vary from 320,000 to 908,000 gross depending upon the percentage of potential users who can be turned into actual users by the promotion of family planning.

The Ministry of Health is of the firm opinion that the proposed condom plant should have a capacity of at least 87.5 million (607,000 gross) condoms annually.

#### Commercial sector

Tables 32 and 33 indicate that condom distribution through the commercial sector is much more active than that of the public sector. However, it was not possible to calculate the actual volume of condoms distributed because importation of condoms on a commercial basis is prohibited as a result of an imbalance in international trade. Consequently, there are no official statistical data on this topic.

There are 6,314 pharmacies and drugstores in Turkey. Condoms are often sold in these outlets although some pharmacies have no stock due to shortages.

The following characteristics were found during a market survey of condoms:

- (a) Condoms are popular and well accepted;
- (b) Condoms are not well distributed and stocks are poor as a result;
- (c) The major supply of condoms is distributed through a "black market";
- (d) Retailers' and wholesalers' prices are comparatively high. This is a consequence of a shortage of supply;

The wholesalers' price is 11 LT per piece, while the retailers' price is 15 LT per piece.

If the price could be reduced, the demand for the product will increase. (A high price elasticity is observed.)

It can be concluded from the above that condom demand in 1983 and thereafter should surpass 500,000 gross annually or even 607,000 gross annually, i.e. 87.5 million pieces - the Ministry of Health's proposed capacity.

#### Manufacturing plant

The Government of Turkey has been interested for a long time in constructing a condom factory to meet the increase in demand and the commercial sector has shown interest in the project since the late 1970s. However, the Government favoured the establishment of the factory by a non-profit organization which possesses high prestige and status, and it has already approached the Turkish Red Crescent Society and given it the necessary permission to implement the scheme. The Family Planning Association of Turkey is likely to act as a collaborator.

#### Turkish Red Crescent Society

The Turkish Red Crescent Society was founded in 1868 under the name of the "Society for Assistance to the Wounded and Disabled in Action". The name was changed in 1877 to the "Ottoman Red Crescent Society" and after 1923 it came to be known as the "Turkish Red Crescent Society". It was admitted to the League of Red Crescent Societies in 1930 and formally recognized by the International Committee of the Red Cross in 1968.

The organization is well established, with 649 local committees in the provinces and sub-provinces. The Society owns 14 facilities in the form of dispensaries in various parts of the country.

Among its activities are "Home Nursing and Mother and Child Care Courses", which are run by the Red Crescent nurses especially trained as instructors in this field. The courses contain information on contraception as part of the curriculum.

The Society's chairman is also chairman of the Turkish Family Planning Association and its board members are also senior members of the FPA. At 30 June 1977, the number of members was 148,000.

Importation and distribution of condoms has been channelled through the Red Crescent organization, and table 34 shows the number of condoms imported in the period 1977-1980.



Table 34. Importation of condoms by the Turkish Red Crescent Society, 1977-1980

Year	Supplier	Quantity
1977	Okamoto Riken Gomu Co. Ltd. (Japan)	1 million pieces (6,944 gross)
1977	Han Kook Latex Gongup Co. (South Korea)	1 million pieces (6,944 gross)
1977	Sagami Industries Sdn. Berhad (Malaysia)	1 million pieces (6,944 gross)
1980	LRC Products Ltd. (England)	Unknown

The organization is eager to establish the condom plant. It has already planned the sites for the plant in Manisa or in Istanbul. The Turkish Red Crescent Society is the appropriate organization to participate in this project since it is familiar with family planning activities and has business experience. It already owns a mineral water bottling company and deals with the supply of various pieces of equipment for hospitals.

#### Family Planning Association of Turkey (FPAT)

FPAT first began work in Ankara and now carries out its services through 36 branches throughout the country. FPAT has been active in all areas related to family planning; but information and education activities were mainly carried out in rural areas. Over 1.5 million people received education for family planning from 1966-1976.

Probably the most ambitious project in the FPAT's planning programme is for the education of soldiers in family planning techniques, although this scheme is presently only being pursued on a small scale.

FPAT is a member of the International Planned Parenthood Federation (IPPF) and receives part of its funding for some of its projects from the Federation. It also receives aid from the Ministry of Health. According to its budget report, 1977-1978, total income for 1977 was approximately 1,700,000 LT of which 1,082,000 LT came from the IPPF and 160,000 LT came from the Ministry of Health. The remainder came from clinic fees, membership fees, and donations from various groups etc.

Individual branches are partially self-supporting, deriving their income from local contributions, fund-raising social activities and other sources.

Contraceptives distributed by the FPAT come from a variety of sources, including the IPPF, the Turkish Development Foundation, drug companies and the Ministry of Health.

The Red Crescent and FPAT are considered to be reliable agencies to take over the condom manufacturing project with the assistance from the General Directorate of Population Planning. However, the problem remains as to how to raise the funds for the operational costs of the plant, even if the initial investment costs were contributed by the United Nations.

#### Implementing the project

The following suggestions are made to implement the project:

##### (a) Financing

1. The initial investment should be borne by the United Nations since Turkey is currently facing difficulties with regard to investment capital. Depreciation costs are ignored in the calculation of production costs.
2. The United Nations should contribute towards a fund for the running costs of the plant for at least three years. Alternatively, the Ministry of Health should create a reserve for such a fund.

##### (b) Distribution

1. GDPP should set up an organization to distribute condoms in the public sector. It is suggested that the plant is not opened until this outlet is assured.
2. If distributed through the public sector, condoms should be free of charge in the first instance.
3. In order to improve the distribution system, it is recommended that the United Nations should make a supply of condoms available from elsewhere during the period of plant construction.
4. At least 200,000 gross of condoms should be distributed through commercial markets. It is recommended that the price in this case should be less than \$8 per gross so that consumers can purchase them at lower prices than at present. This will promote the use of condoms.

##### (c) Promotion

1. In collaboration with other national and foreign bodies, GDPP, the Red Crescent Society and the Family Planning Association, integrated planning should be undertaken to promote the use of condoms.
2. In order to widen the use of condoms, it is recommended that other plans for production of alternative contraceptives should not be implemented until this particular project is well under way.
3. The profit derived from the sale of these condoms in the commercial sector should be used for promotion purposes.

## VI. FEASIBILITY OF BUILDING A CONDOM MANUFACTURING PLANT

The feasibility of building a condom manufacturing plant in Turkey can be examined in the following steps:

### Case I

Whether or not tested condoms should be imported, packaged and distributed in Turkey.

### Case II

Whether or not untested condoms should be imported, tested, packaged and distributed in Turkey after the technology for testing condoms is acquired.

### Case III

Whether it is feasible to construct a complete condom manufacturing plant in Turkey which could test, package and distribute condoms after manufacture.

### Case IV

Whether it is possible to plant and produce the natural latex raw material for condoms.

### Investment in condom packaging plant (case I) and condom testing and packaging plant (case II)

The amount for investment needed is based upon a production capacity of 690,000 gross per annum of packed condoms.

### Case I

Tested bulk condoms will be imported, and will be packed with the aid of electric packaging machines. Aluminium or polyethylene-cellophane foil can be used as the packing material.

### Case II

Untested bulk condoms will be imported and will be inspected by electric pin-hole testing machines. A random sample will be rechecked by various testing devices in the laboratory. The condoms will then be packed with the aid of electric packaging machines.

In order to calculate the amount needed for investment, the following are assumed:

Exchange rate: \$1 = 100 LT

All values are estimated in United States dollars although some of the materials are locally supplied and some may be provided from other countries.

All estimates are based on factory prices at March 1981.

Contingency expenses

Neither the physical nor the price contingency expenses are included in this estimate. It is believed to be meaningless to calculate contingency expenses since the Turkish inflation rate has been unpredictably high in recent years.

Land

The Turkish Red Crescent Society has already prepared the land for this project so land costs need not be included. The area required for case I is 5,500 m<sup>2</sup> and for case II 5,700 m<sup>2</sup>.

Costs for levelling the land (\$15 per m<sup>2</sup>) should be included.

Case I: \$82,500

Case II: \$85,500

Buildings

The plant in each case should consist of a factory, a warehouse, an office and a guardhouse.

The total cost for construction is expected to be \$879,000 and \$939,000 for cases I and II respectively. All estimates are based on information supplied from Turkish sources.

Plant equipment

Included among plant equipment are pinhole-testing machines (this applies only to case II), packaging machines,<sup>11/</sup> laboratory equipment, maintenance tools, spare parts etc.

Case I: \$370,000

Case II: \$840,000

The estimate includes fees for knowhow which may be charged by the suppliers of equipment.

Utilities

Case I: \$99,000

Case II: \$103,000

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<sup>11/</sup> There are two types of packaging for condoms in foil. One is rectangular-shaped, the other is square-shaped. Two different types of packaging machines should be supplied in order to satisfy market demands.

The materials needed for installation can be supplied locally and construction can also be undertaken by local contractors.

Other equipment and installation

Case I: \$34,000  
Case II: \$34,000

A conveyor is needed for transporting products and materials to the warehouse.

It is advisable to install a sound-proof cell in the quality control area where burst tests are performed.

Included are estimates of expenses for installing a ventilation fan in the warehouse.

Travel expenses

Case I: \$21,000  
Case II: \$42,000

The cost is based on economy-class air fares between Japan and Turkey  
2 persons x one-round trip for case I.  
2 persons x two-round trips for case II.

Accommodation and other expenses <sup>12/</sup> include a daily subsistence allowance, fees, accommodation and travel expenses.

2 persons x one-month x 1 for case I.  
2 persons x one-month x 2 for case II.

Optional expenses

Case I: \$50,000  
Case II: \$60,000

Air-conditioning units will need to be installed in the pinhole-testing section (case II only), packaging section, quality control area and the office building.

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<sup>12/</sup> Expenses for training and education are not needed in either case.

Transportation

Case I: \$30,000  
Case II: \$58,000

On the basis of shipments from Japan to Turkey, transportation includes ocean freight, export taxes, tracking and other handling charges for all the equipment except construction materials. However, not included are import taxes which may be imposed by the Government of Turkey.

Total investment<sup>13/</sup> (see table 35)

Case I: \$1,515,500  
Case II: \$2,101,500

The difference in investment costs between cases I and II is more than \$0.5 million. This is accounted for by the need to instal pinhole-testing machines in case II. In this respect, the plant in case I has a lower budget and is of minimal size; the quality of condoms can be guaranteed as long as supplies of bulk condoms are available from creditable sources. This is still the case even if the supplier does not inspect condoms with pinhole-testing devices.

Each major manufacturer of condoms throughout the world has its own technology; the products are manufactured in their own fashion utilizing unique production processes. If the Government of Turkey decides to adopt either case I or case II at the first stage from a manufacturer, it is recommended that the same manufacturer provide technical assistance when Turkey develops the plant to produce condoms at the second stage. It is important to produce standardized condoms and to avoid unnecessary technical confusion.

Condom packaging plant

Building

A condom plant is a complicated structure; there are no special demands such as sound-proofing, water-proofing. Sterilization is not required as it is when a pharmaceutical factory is built.

Table 36 shows the number of residential, commercial and governmental buildings which have been built up to 1970, and table 37 gives the figures for domestic production of iron and steel, glassware and cement in 1979.

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<sup>13/</sup> Excluding optional expenses.

Table 35. Investment costs in cases I and II  
(United States dollars)

Item	Case I	Case II
Land	275 000	285 000
Levelling the ground	82 500	85 500
<b>Buildings</b>		
Factory	300 000	345 000
Warehouse	300 000	300 000
Other	75 000	90 000
Office	200 000	200 000
Guardhouse	4 000	4 000
	<u>879 000</u>	<u>939 000</u>
<b>Plant equipment</b>		
Pinhole-testing machines	-	450 000
Packaging	220 000	220 000
Inspection	120 000	120 000
Maintenance	20 000	30 000
Spare parts	10 000	20 000
	<u>370 000</u>	<u>840 000</u>
<b>Utilities</b>		
Boiler	50 000	50 000
Electric	13 000	13 000
Piping	18 000	20 000
Light fixtures	18 000	20 000
	<u>99 000</u>	<u>103 000</u>
<b>Other equipment and installation</b>		
Conveyor	8 000	8 000
Sound-proof cell	8 000	8 000
Ventilation	18 000	18 000
	<u>34 000</u>	<u>34 000</u>
<b>Travel expenses</b>		
Air fares	9 000	18 000
Accommodation expenses etc.	12 000	24 000
	<u>21 000</u>	<u>42 000</u>
Optional expenses (air-conditioning units)	50 000	60 000
Transportation	30 000	58 000
<b>Total investment (excluding optional expenses and land cost)</b>	<u>1 515 500</u>	<u>2 101 500</u>

Table 36. Buildings by use and building materials, up to 1970

Material	Wholly residential	Mostly residential	Wholly commercial	Mostly commercial	Wholly governmental	Mostly governmental	Religious	Medical	Educational and cultural	Others	Total:
Masonry	2 182 220	269 554	405 124	52 282	21 302	5 310	15 340	3 292	14 566	89 670	3 058 658
Wood	714 558	83 804	89 366	9 980	1 692	390	2 330	92	836	56 920	959 966
Mud-brick	816 310	93 654	47 372	5 650	1 028	182	1 810	74	524	48 184	1 014 798
Mixed	420 176	57 636	49 118	5 312	1 474	354	2 260	108	906	23 952	561 296
Others	32 692	2 664	4 992	274	246	24	208	12	140	5 014	46 266
Total	4 165 956	507 312	595 982	73 498	25 742	6 260	21 948	3 574	16 972	223 740	5 640 984

Source: Statistical Pocketbook of Turkey (Statistical Information Service, 1980).



Table 37. Domestic production of iron and steel, glassware and cement, 1979

Product	(Thousand tons)
Pig iron	327
Crude iron	1 901
Steel ingots	1 789
Angles	41
Semi-finished products	2 441
Bars made of iron and steel	645
Pipes and tubes	12
<u>Glass and glassware</u>	
2.4 mm	120.0
5 mm	13.0
6 mm	5.0
7 mm	3.3
<u>Cement production</u>	
Public	5 184
Private	8 600

Electric power supply

With regard to the necessary electricity supply for packaging condoms, sufficient power will be supplied although stoppages may occur for one or two hours a day.

The electricity supply consists of:

Phases: 3 lines AC 380 V  
Single phase: Single line AC 220 V  
Frequency: 50 Hz

Machinery for packaging

All machinery will be supplied by the company undertaking the project.

Packaging materials

The necessary packaging materials are produced locally and can be easily obtained. A domestic pharmaceutical company has stated that it has used local materials for packing pills and other medicines.

The lubricant for condoms must be imported since it is not manufactured in Turkey. Import regulations are not stringent as long as it is imported as a raw material. It will be classified in liberalization list no. 1.

There is no limit on the value or quantity of individual goods that can be imported under this list. However, there is an overall annual limit, which varies in magnitude and the Ministry of Commerce has the power to suspend, either temporarily or permanently, the importation of any commodity if necessary. Goods included in this list are mainly raw materials and spare parts.

#### Work-force

There is an abundance of unskilled labour in Turkey. As the packaging operation is simple and does not require much training, it is believed that there will be little difficulty in obtaining the labour force required.

#### Plant for testing and packing

Operation of the factory will be divided into three parts: first, untested goods will be checked by machines to see whether pin-holes exist or not. Secondly, the tested products will be re-checked for quality at a laboratory. Thirdly, the passed products will be packed by machines.

#### Machinery for testing and packaging

The bulk of the machinery for testing and packaging will be provided by the company undertaking the project.

#### Laboratory equipment

The equipment in the laboratory for inspection purposes will be supplied entirely by the company undertaking the project.

#### Other materials

Surface active agents are not produced in Turkey and will have to be imported.

#### Work-force

Skilled labour is not required to operate testing machines; but unskilled labour should be trained for this purpose. Training will take approximately two months.

One supervisor at a high school diploma level is needed in the laboratory. The level of education in Turkey is not as high as in developed countries, but 4.9 per cent of the population is enrolled in either high school or at vocational schools at the high-school level (see table 38), and it will not be difficult to obtain the labour force required.

To maintain smooth operation of the factory an electrical engineer is also needed, as well as several unskilled women for laboratory testing, but these need not have high-school diplomas.

#### Condom manufacturing plant

Condoms will be manufactured in the plant by moulding machines, and will then be tested, packed and delivered to the market.

#### Machinery

The machinery and equipment for producing condoms will be provided by the company undertaking the project.

#### Utility equipment

The utility equipment required can be prepared in Turkey without difficulty. There are plenty of factories which are able to equip more complex facilities than this project needs.

#### Electricity supply

Usually, the electricity supply is not a problem since the consumption is not significantly high. However, frequent stoppages may affect continuous production. The supply is presently stopped for one to two hours a day in the city; even in the industrial areas, stoppages can occur from time to time.

Consequently, the installation of a generator is advisable to avoid defective goods and so that the moulding machines can be operated continuously.

#### Drainage and water supply

To operate the factory for 24 hours a day would mean a high consumption of water. Water supplies are limited in Turkey, and to solve this problem it is recommended that a well be dug to act as a reserve supply. It is anticipated that it should be dug at least 100 m deep to obtain sufficient volume and to avoid pollution.

Table 38. Population aged 6 years and over completing specified level of formal education, by sex, 1975  
(Percentage)

Level of school	Total		Male		Female	
	Number	%	Number	%	Number	%
Illiterate	12 830 691	38.1	4 247 429	24.9	8 583 262	51.7
Literate, no diploma	5 711 850	17.0	3 369 686	19.7	2 342 164	14.1
Primary school	11 762 162	34.9	7 167 687	42.0	4 594 475	27.7
Junior high school	1 609 455	4.8	1 087 861	6.4	521 594	3.1
Vocational school at junior high school level	36 730	0.1	23 200	0.1	13 530	0.1
High school	733 402	2.2	493 927	2.9	239 475	1.4
Vocational school at high school level	540 747	1.6	348 416	2.0	192 331	1.2
Faculty and other higher educational institutions	333 107	1.0	266 014	1.6	67 093	0.4
Unknown	113 977	0.3	80 405	0.5	33 572	0.2
Total	33 672 121	100.0	17 084 625	100.0	16 587 496	100.0

Source: State Institute of Statistics, Statistical Yearbook of Turkey, 1977.

Note: Based on a 1 per cent sample of the 1975 census of population. Percentages may not add to 100 due to rounding.

At present, there are no legal restrictions on waste waters in Turkey. However, from a social point of view, it is recommended that waste waters be treated by installed devices.

Fuel

Fuel will be needed in the factory for the supply of steam. Heavy oil is recommended rather than coal, although Turkey is well-known as a coal-mining country on a large scale (see table 39).

Table 39. Production and sale of selected minerals, 1979

Mineral	Number of establishments	Production <u>a/</u> (Thousand tons)	Sale <u>b/</u>	
			(Thousand tons)	(Thousand LT)
Coal	3	7 199	4 055	7 154 565
Lignite	203	15 599	13 968	7 228 052

Source: Statistical Pocketbook of Turkey (Statistical Information Service, 1980).

a/ Run of mine.

b/ Run of mine, minerals after smelting, washing or concentrating.

Heavy oil is preferred because it is more convenient than coal for handling and storage purposes. A large volume of oil is not required so it will be difficult to obtain either domestically produced or imported oil. Table 40 shows the 1979 production and importation figures for crude petroleum.

Table 40. Domestic production and importation of crude petroleum and selected petroleum products, 1979

Product	Thousand tons
<u>Crude petroleum</u>	10 960
Production	2 845
Imports	8 115
Gasoline	1 860
Kerosene	442
Motor oil	2 421
Solvent	23

Source: Statistical Pocketbook of Turkey (Statistical Information Service, 1980).

Raw materials and chemicals

The raw material needed, i.e. natural rubber latex, is entirely imported, mainly from Malaysia. Rubber latex imports ceased in 1980, but supplies have now been resumed. Istanbul producers of rubber gloves have been using natural rubber as the raw materials.

Although no study was carried out on the tax rate for the importation of rubber, the expense will not be a burden in the production of condoms since the raw materials costs constitute only a small proportion of total production costs.

Domestically produced chemicals needed for compounding purposes consist of only three: sulphur, zinc oxide and aqueous ammonia (25 per cent) (see table 41). The other chemicals required for compounding will need to be imported.

Since the most important technology in the production of good quality condoms is compounding the latex and chemicals, careful attention should be paid to quality control.

In this respect, the three chemicals listed above should be imported at the first stage until the quality of the local products is ascertained.

Table 41. Production of minerals in Turkey, 1979

Mineral	Tons
Zinc	24 000
Sodium sulphate	143 000
Sulphuric acid	161 000
Ammonium sulfate	130 000
Ammoniac	69 925
Condensed nitric acid	3 774
Ammonium nitrate	272 624
Ammonium nitrate, synthetic	17 015
Ammonium sulfate	47 360
Superphosphate	584 629

Source: Statistical Pocketbook of Turkey  
(Statistical Information Service, 1980).

About one half of the fifty chemicals needed for analysis of rubber latex can be imported from other countries.

#### Work-force

About 20 directors and managers with college educations may be needed to control the firm. Another 20 supervisors and technicians who have graduated from high school or from a vocational school at the high school level must also be employed. Including unskilled labourers, the factory as a whole needs at least 180 employees.

It is therefore recommended that the factory site be located near a large city where abundant labour resources are available.

#### Feasibility of establishing a rubber plantation

It is predicted that it will not be feasible to produce natural rubber in Turkey for the supply of the main raw material, rubber latex.

There are over 30 countries which grow and produce rubber; these include Brazil, Indonesia, Ivory Coast, Malaysia and Nigeria. All these countries are located in low latitudes and there does not exist a rubber plantation situated above 20° North or South.

Two conditions are required to grow natural rubber: high temperature and sufficient precipitation throughout the year. The temperature should be 28-34°C throughout the year and an annual rainfall of 2,500 mm is required. Even in the most advantageous region, the Aegean-Mediterranean coastal provinces, summers are hot and winters are relatively mild. The rainfall is insufficient.

It should be noted that condom manufacturing demands high quality natural rubber latex as the raw material in order to produce pinhole-free condoms. The specifications for natural latex are strict. Therefore, it is not worthwhile developing a technology of producing natural latex for the production of condoms as the necessary volume of latex will not prove to be substantial.

The main raw materials, natural latex, should be imported. It is also recommended that Malaysian rubber latex is the most appropriate raw material for the production of condoms because of its high uniform quality.

VII. INVESTMENT IN A CONDOM MANUFACTURING PLANT

Estimate

All calculations are based on costs as of April 1981.

Land

Land costs 5,000 LT per m<sup>2</sup> in industrial areas near Istanbul. Nine thousand m<sup>2</sup> will be needed for constructing the plant. Therefore, 45 million LT will be required for investment. However, this cost is not included in the total investment as the land is already owned by the Turkish Red Crescent Society.

Buildings

Generally speaking, an ordinary factory building would cost about 30,000 LT per m<sup>2</sup> when no special equipment is required.

Therefore, a building of 4,500 m<sup>2</sup> will cost approximately 135 million LT. This does not include lighting, plumbing and other facilities.

Equipment

The following estimates in US dollars are for factory equipment which will be supplied by the company undertaking the project:

Compounding equipment	430,000
Moulding equipment	3,050,000
Pinhole-testing equipment	450,000
Packaging equipment	220,000
Quality control and laboratory equipment	210,000
Generator	550,000
Maintenance tools	240,000
Spare parts (for three years)	130,000
Sub-total	<u>5,280,000</u>
Transportation costs including ocean freight, export taxes, tracking and other handling charges	300,000
Total <sup>14/</sup>	<u>5,580,000</u>

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<sup>14/</sup> Import taxes are not included; these might be imposed by the Government of Turkey.



Other equipment

Other equipment which can be obtained on the domestic market include:

Boiler	7 million LT
Water pump	3 million LT
Electrical power	2 million LT
Plumbing	3.5 million LT
Light fixtures	2.5 million LT
<b>Total</b>	<b>18 million LT</b>

Travel expenses

Table 42 shows the number of months engineers spend at work and in travel from the construction of the plant until the first run.

Table 42. Travel of engineers and instruction periods

<u>Qualification</u>	<u>Persons</u>	<u>Man/months</u>	<u>Man/round trip</u>
Co-ordinating managers	2	9	3
Chief engineer	1	8	2
Mechanical engineers	2	6	1
Electric engineers	2	6	1
Chemical engineers	2	4	1
<b>Total</b>	<b>9</b>	<b>58</b>	<b>14</b>

It is assumed that the expense for each engineer is \$6,000 per month and the air fare for the travel cost is \$4,500 for each person. The total estimate will be \$411,000 as shown below.

Accommodation and other expenses	\$6,000 man/month
Total of 58 months	\$348,000
Travel expenses (14 round trips x \$4,500) <sup>15/</sup>	\$63,000
<b>Total</b>	<b>\$411,000</b>

<sup>15/</sup> Travel expenses include excess luggage fees, and estimate is based on air fare between Japan and Turkey.

Training and educational expenses

Some of the Turkish managers and supervisors should be selected for training abroad in order to learn the important facts of condom production and factory management.

These should include the factory manager and chemical, mechanical and electrical engineers. The cost will be:

Expenses for stay abroad	\$5,000 man/month x 12 month (4 persons x 3 months)	- \$60,000
Travel expenses (including excess luggage fees)	\$4,500 man/round trip x 4	<u>\$18,000</u>
	Total	\$78,000

Total investment

Table 43 contains the total investment cost for a condom plant in Turkey.

Table 43. Total investment for a condom plant in Turkey

<u>Item</u>	<u>Millions of dollars</u>
Buildings	1.35
Equipment	5.28
Transportation of equipment	0.30
Other equipment	0.18
Accommodation and other expenses	0.41
Training expenses	0.08
	<u>7.60</u>
Total	7.60

Production and operational costs

The following assumptions have been made:

- (a) Total production per annum: 552,000 gross of condoms  
Total operational days per year<sup>16/</sup>: 230 days  
Daily production: 3,000 gross x 230 days = 690,000 gross/year  
Rate of yield: 80 per cent (the yield rate for the first year is under-estimated);
- (b) Cost of latex and other chemicals excludes import taxes;
- (c) Labour cost is estimated from table 44;
- (d) Calculation of electricity charges is based on 5 LT/kW/hour;
- (e) Fuel cost is calculated from the cost of heavy oil in Turkey (35 LT/litre);
- (f) Water charges are based upon the rate in Istanbul (5 LT/m<sup>3</sup>);
- (g) Depreciation costs are ignored since the plant will be donated by the United Nations;
- (h) Property taxes are not included;
- (i) Promotion costs such as advertising, discount expenses and other marketing costs are excluded, and the total production costs are shown in table 45.

Table 44. Salaries and wages in Turkey  
(Turkish lira)

Title	Salaries/month	Fringe benefits/year	Total/month
President	80 000	120 000	90 000
Vice-President	70 000	105 000	79 000
Director	70 000	105 000	79 000
Manager	60 000	90 000	68 000
Supervisor	45 000	67 500	50 000
Engineer	40 000	60 000	45 000
Staff	20 000	30 000	22 500

Source: Turkish Red Crescent Society.

<sup>16/</sup> Weekends 10<sup>4</sup> days, national holidays 15 days, paid holidays 16 days.

Table 45. Production cost of condoms<sup>a/</sup>  
(United States dollars)

<u>Item</u>	<u>Per gross</u>
Latex	0.60
Chemicals	0.22
Electricity charges	0.14
Fuel costs	0.23
Water charges	0.01
Labour charges	0.74
Packaging materials	0.53
General expenses	0.04
Total	2.51

a/ Does not include cost for boxes, i.e. the products are not packed in boxes in dozens.

Administration and general expenses

Salaries and wages <sup>17/</sup>	\$0.37/gross
Office expenses <sup>18/</sup>	\$0.02/gross
Sales expenses <sup>19/</sup>	\$0.03/gross
Insurance <sup>20/</sup>	\$0.01/gross
Distribution expenses	\$0.02/gross
Other expenses <sup>21/</sup>	\$0.02/gross
Total	\$0.47/gross

Total cost

The total cost of \$2.98/gross is for semi-packaged products, i.e. condoms not packed in boxes of a dozen.

<sup>17/</sup> Salaries and wages include bonuses, entertainment and other fringe benefits.

<sup>18/</sup> Office expenses include postage, telephone, telegram, printing and stationery.

<sup>19/</sup> Sales expenses include travelling, accommodation and other business expenses.

<sup>20/</sup> Insurance includes social security, compensation insurance etc.

<sup>21/</sup> Other expenses include vehicle upkeep, water, maintenance of electrical fittings and others.

VIII. PLANNED FACTORY SITES

Factory sites prepared and owned by the  
Turkish Red Crescent Society

Two planned factory sites prepared and owned by the Turkish Red Crescent Society were inspected.

Site I is at Manisa, 40 km north-east of Izmir, the third largest city in Turkey. It took 45 minutes to drive there by car from the centre of Izmir (see figures VIII and IX). The address is 10-435, Uncuboz, Mekkez, Manisa.

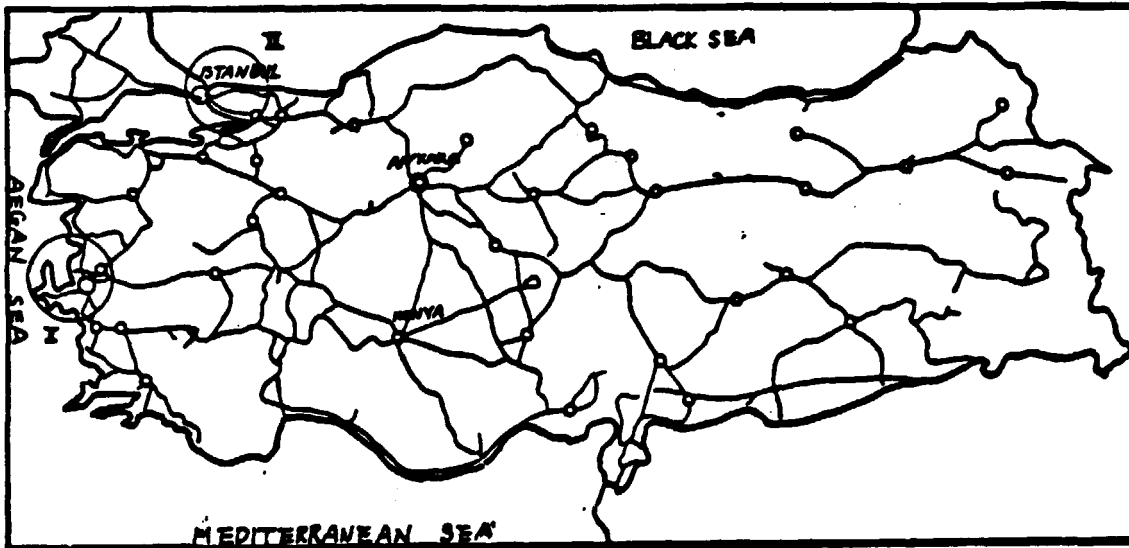
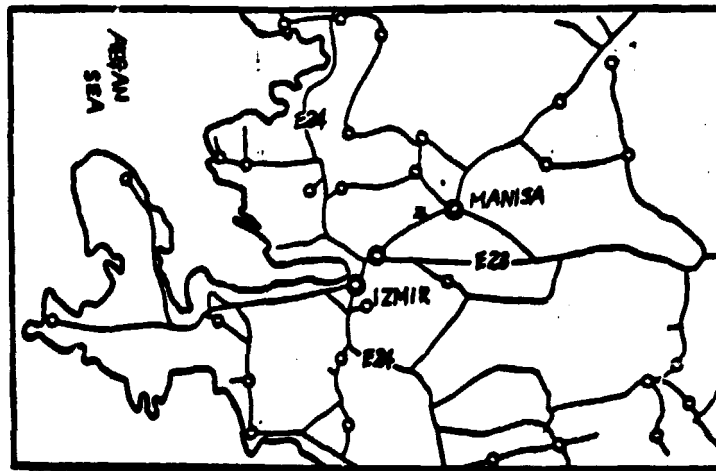


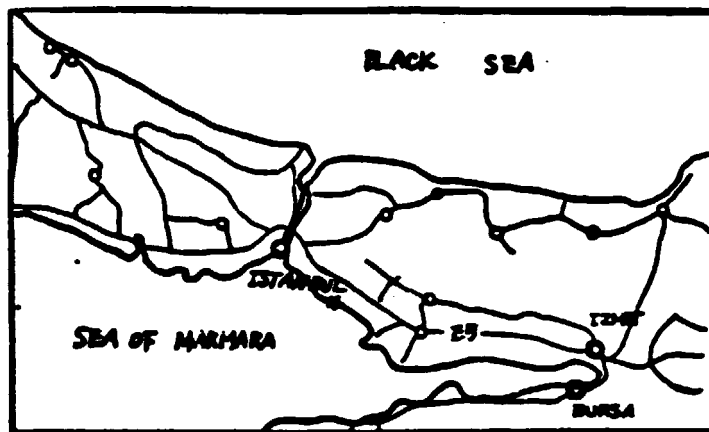
Figure VIII. Turkey



\* Factory site I.

Figure IX. Manisa

Site II is at Istanbul, located 25 km east of central Istanbul. However, it might take 40 minutes to drive there by car from the centre of Istanbul due to constant traffic congestion (see figure X). The address is 23-293, Kartal, Istanbul.



\* Factory site II.

Figure X. Istanbul

The environment

Temperature

Table 46 indicates that the temperature for Izmir and Istanbul is mild throughout the year (data from Izmir only, but the conditions in Manisa can be regarded as almost the same).

Table 46. Average monthly temperature in Izmir and Istanbul (°C)

Site	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Izmir	8.6	9.6	11.1	15.5	20.4	25.0	29.6	27.3	23.3	18.4	14.3	10.6
Istanbul	4.6	3.0	6.7	11.8	16.6	20.2	23.9	24.3	20.3	16.1	11.3	8.6

Source: Statistical Pocketbook of Turkey (Statistical Information Service, 1980).

Both sites are satisfactory for constructing a condom plant; vulcanization of compounded latex can be done adequately in the mild temperatures.

Humidity

High humidity makes stored products deteriorate quickly; but there is no problem at either site as shown in the statistical data in table 47.

Table 47. Average monthly humidity in Izmir and Istanbul  
(Percentage)

Site	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Izmir	71	69	65	62	60	52	48	49	55	64	70	71
Istanbul	80	79	77	76	77	72	68	69	73	77	79	80

Source: Statistical Pocketbook of Turkey (Statistical Information Service, 1980).

Precipitation

As long as the buildings are protected from rainfall, no serious problems in that regard can be expected. Rainfall figures are shown in table 48.

Table 48. Average monthly precipitation in Izmir and Istanbul  
(Millimetres)

Site	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Izmir	143	104	69	43	36	9	1	3	10	33	81	168	700
Istanbul	118	50	48	48	24	31	3	0	42	44	43	99	550

Source: Statistical Pocketbook of Turkey (Statistical Information Service, 1980).

Flood

There has never been any flooding at site I (Manisa). However, site II (Istanbul) has experienced floods although the site escaped from the disaster as the location was elevated. If a plant is constructed at this site, careful attention should be paid to the creek nearby.

Snow

There has been some snowfall in winter, but it was not of any significance.

Insects

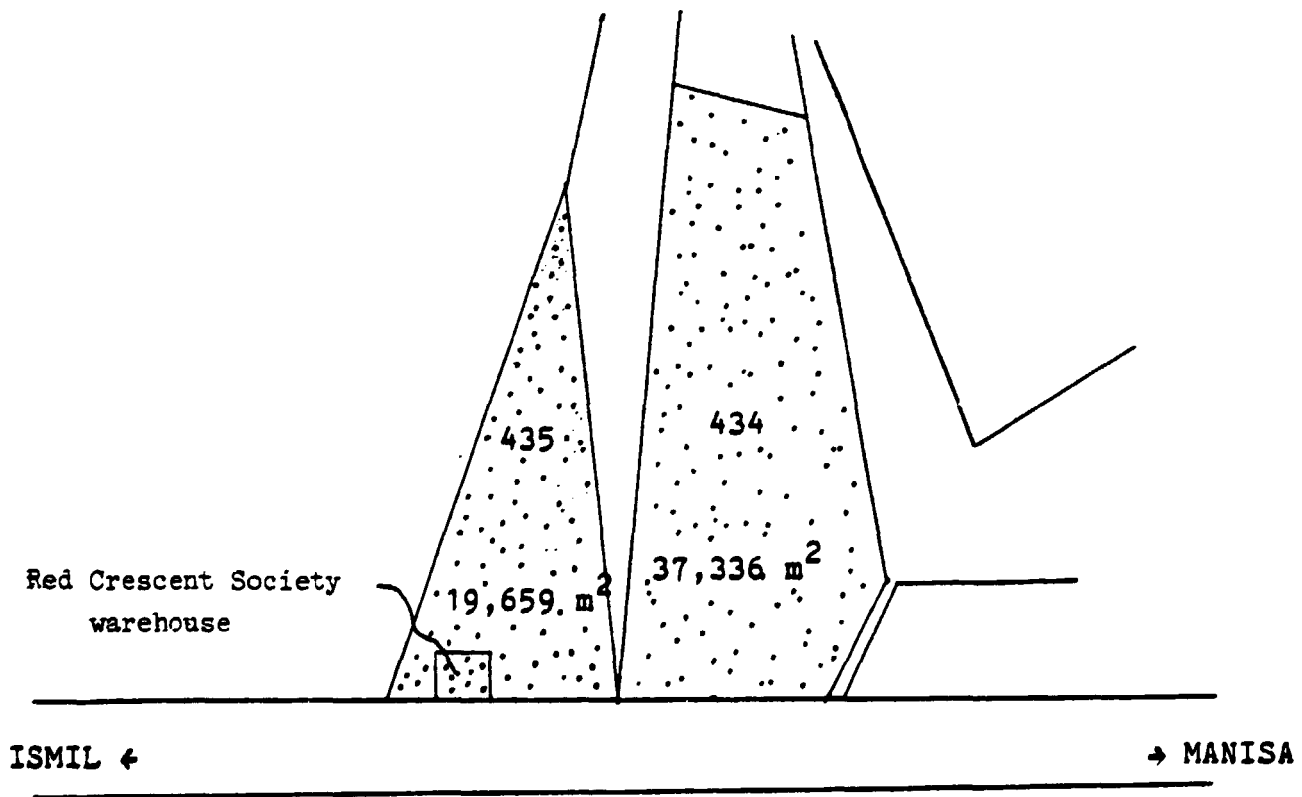
No insect problem exists at site I, but at site II small mosquitos breed in the summer. It is not a serious problem, however, it is advisable to screen all windows.

Other

No other calamities such as storms, earthquakes or tidal waves are anticipated.

Surface conditions

Site I is an area of 37,336 m<sup>2</sup>; the ground surface is uneven and covered with weeds. The irregular ground should be levelled before construction of the plant. Alongside the road there is a building used for storage by the Turkish Red Crescent Society (see figure XI).



Manisa → Bursa → Istanbul Road  
Figure XI. Factory site I (Manisa)



The land area of site II is 22,332 m<sup>2</sup>, it is a wide open space covered with grass. A small hill lies behind the site, and by simply levelling it, the site will be usable for the plant (see figure XII).

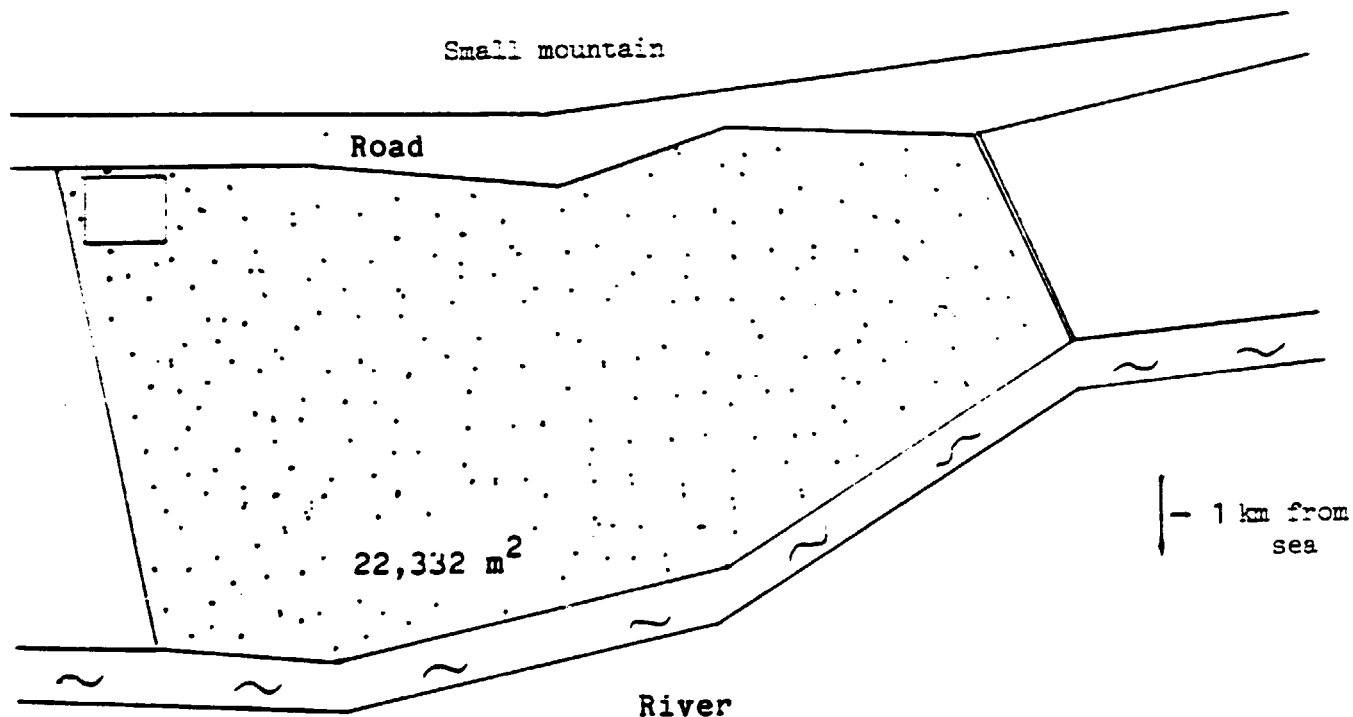


Figure XII. Factory site II (Istanbul)

### Transport

#### Transportation

The planned sites, Manisa and Istanbul, are convenient for distribution purposes. Both sites are less than 50 km from the centre of a large city which trades in a large quantity of consumer goods. Istanbul is the most populated city in Turkey, and Izmir is the third largest and has the fastest growing population.

A railway line is also available for transportation purposes in Istanbul.

#### Harbour

Istanbul is the largest port city in Turkey, in terms not only of imports but also of exports. Izmir is also known as one of Turkey's main ports.

In this sense, a condom plant, either at Istanbul or Manisa, is expedient to transport imported raw materials or to export goods to foreign countries.

#### Roads

Site I has a road connecting Izmir and Bursa. At present, it is single lane, but it will be widened into a double lane in the near future.

A road by site II also has a single lane but it is narrower than the road at site I.

Truck traffic is possible at both sites.

#### Transportation for workers

From the centre of the city of Manisa it is only a few kilometres to site I. The road by the site is also on a city bus route. It is possible to have a special bus service under a contract with the city bus company.

No problems exist at site II as long as workers from the neighbourhood are employed.

It may be considered worthwhile for the company to acquire a minibus for night-shift workers.

#### Water

##### Water supply

There is a limited city water supply at site I and it will be necessary to dig a well up to 120 m deep to get a sufficient quantity of water. Usable city water is restricted to 10 tons per hour for 10 hours a day (100 tons/day).

At site II at Istanbul, only 30 tons per day is permitted by the Water Works Bureau. It is also necessary to dig a well up to about 100 m deep. Salinity should be checked at the time the well is dug since the site is close to the sea.

The permission of the authorities should be obtained prior to excavation in both instances.

##### Drainage

At present there are no restrictions on drainage, but it will be legalized in the near future. In this connection, it is advisable to have

equipment for cleansing the water from the beginning of the operation.

There is a creek 200 m from site I. Used water can be taken there for the present, although it is reported that there is a plan by local government to install industrial drainage.

There is also a creek close to site II, and it can be used for drainage purposes.

#### Electricity supply

Both planned factory sites are in industrial areas and it is possible to operate the factory for 24 hours a day without stoppages. There is a power failure for two hours a day in most areas.

It is suggested that a small generator be supplied to overcome the results of such stoppages. The rate of yield could then remain constant and defective goods will be at a minimum. It is prohibited, however, to import a generator without permission.

#### Work-force

Site I (Manisa) has a population of about 100,000 inhabitants. Site II has a population of 50,000 at Kartal. The work-force at either site for the normal work is not hard to obtain, since an abundant labour force is available throughout Turkey. Unskilled workers can be trained into skilled labour after employment.

Some technicians and managers need to be brought to the selected site from the larger cities.

## IX. SCHEDULE OF PLANT CONSTRUCTION

The length of time required to construct a plant is shown in figure XIII; it starts from the day when the contract is signed:

(a) As soon as the donors and the company reach agreement and sign the contract, the company begins to design the required plant (two months). The company orders all the construction materials and the machinery and equipment;

(b) In accordance with the design, the company builds the machinery and installs the equipment (six months);

(c) All the machinery and equipment will be assembled in the company's home country. A test-run will be made (trial production). After confirming performance, the machinery and equipment will be disassembled (five months);

(d) Disassembled machinery and equipment will be packed for shipment. Sea freight to Turkey will be booked (two months);

(e) The machinery and equipment will be shipped to the plant site in Turkey within three months. This period includes transportation inland;

(f) At the factory site, buildings will be constructed in accordance with the design by the time the machinery and the equipment arrives (before the 12th month);

(g) The machinery and equipment will be unpacked. It will be re-assembled at the factory building which was built at the site (four months);

(h) Trial run for a double check is made. At this point, the Turkish staff take over the plant (two months);

The above schedule is a rough estimate of the number of months spent on construction; the period can be shortened to 15 instead of 18 months.

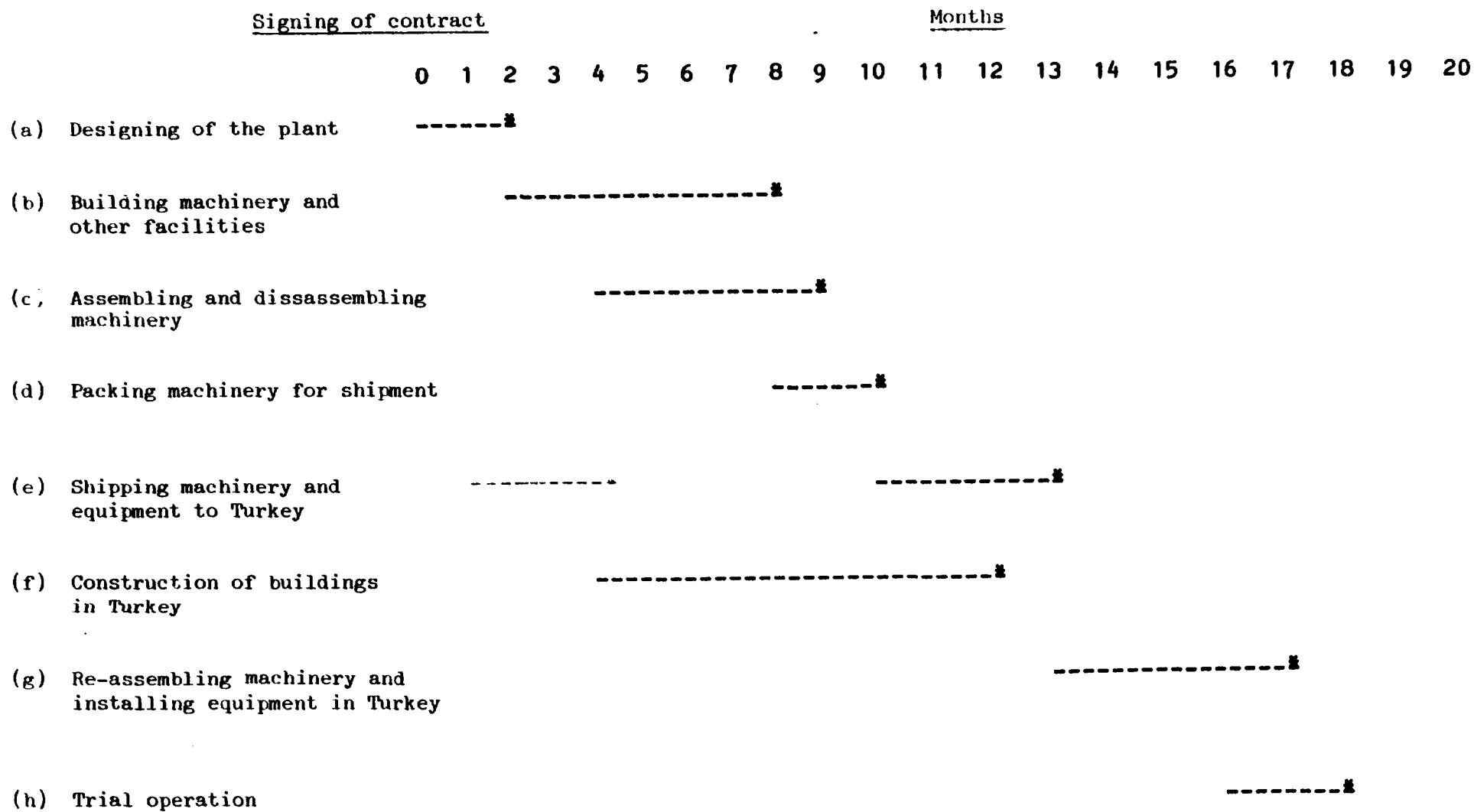
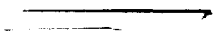


Figure XIII. Schedule of plant construction



## X. EQUIPMENT REQUIRED

### Buildings

Figure XIV shows the layout of the condom manufacturing plant. The plant consists of four buildings: office, factory, warehouse and maintenance building. The capacity is for 552,000 gross per year.

#### Office

No special requirements are required for the office building.

#### Factory

The factory building consists of eight areas. The building can be constructed of ferro-concrete with brick walls. The roof should be of slate.

##### (a) Compounding section

To maintain the quality level of the rubber latex and vulcanized materials, this area should be kept at a temperature of 15-25° C. It is recommended that a refrigerating apparatus is installed in order to keep compounding materials fresh. Also, heat-insulating materials should be used. It is advisable to have the appropriate equipment for the cleansing of waste water;

##### (b) Dipping section

A constant temperature should be maintained for continuous production throughout the year. Heat-insulating materials should also be installed;

##### (c) Drying section

A ventilator should be installed;

##### (d) Other areas

No special requirements are necessary in these areas.

#### Warehouse

No particular specifications for the warehouse are needed as long as the building is in good condition. It will be convenient if a truck is able to drive into the warehouse.



Maintenance building

No special requirements are needed for the maintenance building which consists of a workshop, boiler house, electricity substation and generator room.

Production machinery and equipment

Equipment and tools required for condom production

(a) Compounding equipment

Capacity: more than 1,200 l/day

Vulcanizing mixer	Cooling water tanks
Ball mills	Latex tanks
Colloid mills	Air compressors
Distilling apparatus	Water tanks
Cooling apparatus	Measuring equipment
Water pumps	Others

(b) Automatic moulding equipment

Capacity: more than 125 gross/h  
(Operating 24 hours daily. Actual production quantity is calculated by subtracting defective goods.)

Automatic moulding machine	Dust collectors
Drying apparatus	Containers
Chiller units	Cooling apparatus

(c) Automatic pinhole-testing equipment

Capacity: more than 160 gross/h  
(Operating 24 hours daily. Subject to change depending upon workers' skill.)

Automatic pinhole-testing machines  
Containers

(d) Packaging equipment

Capacity: more than 150 gross/h  
Packaging machines (heat sealer)  
Lubricating apparatus



(e) Quality control equipment

Water-leakage testing device	Gauges for measuring thickness
Bursting-volume testing device	Punchers (dumb-bell type)
Tensile-testing device	Balances
Aging ovens	Air compressor
Electrical-testing device	Others

(f) Laboratory instruments

Stability tester	Stroboscope
Densitometer	Stop-watches
Ovens	Weighing bottles
Ph meter	Water-distilling apparatus
Stirrers	Erlenmeyer flasks
Cylinders	Reagents
Desiccators	Volumetric flasks
Balances	Small ball mills
Rubber roller	Glass plates
Beakers	Small vulcanizing apparatus
Thermometers	Glass moulds
Plastic beakers	Air compressor
Dispersing balances	Water baths
Pipettes	Refrigerators
Burettes	Viscosimeters
Filter paper	Others

(g) Boiler equipment

Capacity: 1.5-2.5 ton/h  
(Normal pressure is 6 kg/cm<sup>2</sup>)

Water-tube boiler or once-through boiler (for heavy oil)

(h) Water tank and water pump equipment

Pump: Capacity of more than 30 ton/h

Tank: Capacity of more than 10 m<sup>3</sup>

(i) Electrical power equipment

Capacity: more than 800 kw/h

AC 220 V

AC 380 V

50 Hz

(j) Equipments and tools in workshop

Lathes	Air compressors
Bench drills	Chain blocks
Grinders	Vacuum cleaner
Portable electric grinders	Working table
Hacksaws	Piping tool
Surface plate	Hand tool
Portable electric drills	Measuring tool
Stand-type electric drills	Electricity testers
Electric welders	Carpenter's tool
Gas welders	Tapping tool
Anvil	Others
Winches	

Tools for plant construction

Special tools for plant construction are not required as the tools in the workshop can be utilized.

## XI. PRODUCTION OF CONDOMS

### Description of the manufacturing process

The condom manufacturing process can be divided into five procedures which are depicted in figure XV:

1. Compounding process.
2. Moulding process.
3. Drying process.
4. Pinhole-testing process.
5. Packaging process.

#### Compounding

##### (a) Dispersing

Compounding chemicals in the ball mill are crushed into particles and are dispersed by being stirred gently so that they become uniform;<sup>22/</sup>

##### (b) Homogenizing

After the ball-milling, compounding chemicals are crushed again to become smaller particles by homogenization;

##### (c) Vulcanizing

Latex is then poured into the vulcanizing tank for the purpose of vulcanization.

#### Moulding

A circular chain, the most important part of a condom plant, is automatically and continuously operated by means of a sprocket wheel.

##### (a) First dipping

Dosed latex is placed in a dipping tank. When glass moulds are dipped into the tank, an amount of latex adheres to each mould;

##### (b) First drying

The moulds move to a drying chamber in order for the moisture to evaporate and for the condoms to be shaped on the glass moulds.

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<sup>22/</sup>At the time of compounding, distilled water is required.

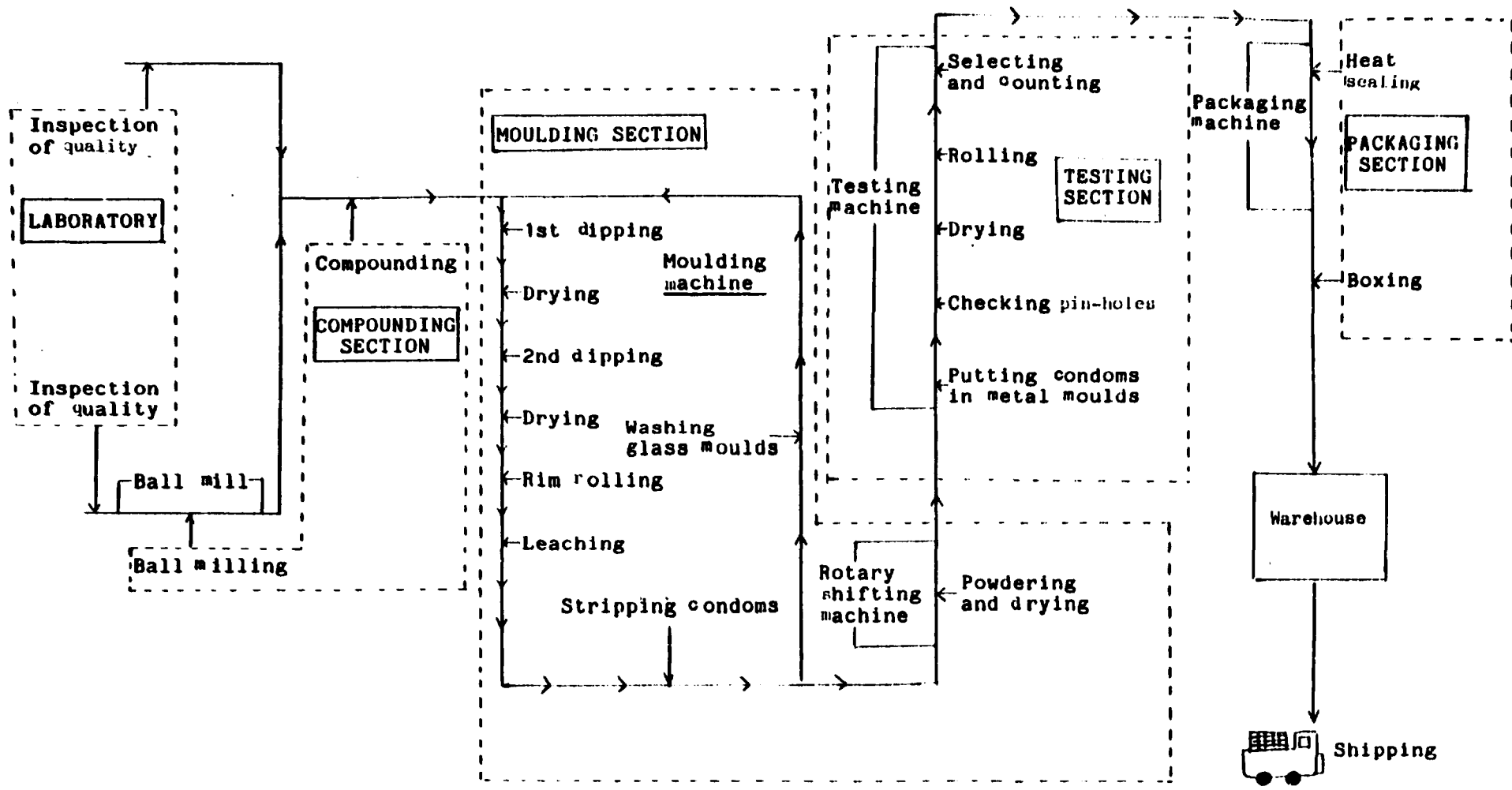


Figure XV. Flow chart of condom manufacturing process

(c) Second dipping

To avoid pin-holes, the glass moulds are again dipped into the tank so that a double-walled condom will be produced;

(d) Second drying

After the second dipping, the moulds are again moved into the drying chamber;

(e) Rim rolling

When the moulds reach the rim-rolling apparatus, the edges of the condoms are automatically rolled to form a rubber ring;

(f) Leaching

The glass moulds are then placed in a hot water bath to remove impurities and the remaining chemicals;

(g) Stripping

After entering the hot bath, the condoms are automatically stripped from the moulds;

(h) Washing

The moulds are then washed with a revolving brush and are returned to the first dipping tank.

Drying

Condoms which are stripped from their glass moulds are transferred to a rotary shifting machine. The excess powder on each condom sheath is removed and at the same time, vulcanization takes place.

Pin-hole testing

Automatic pinhole-testing machines make use of the insulation character of the rubber which tests the condoms for pin-holes. This machine can also roll up and count the condoms.

(a) Putting on

Untested condoms are placed by hand on the metal moulds;

(b) Pin-hole testing

With the aid of an electronic device, condoms are judged to see whether or not there is a pin-hole; this is recorded on the apparatus;

(c) Rolling and selecting

After being automatically rolled up, the satisfactory and unsatisfactory condoms are automatically counted and fall into separate collecting bags.

### Packaging

After pin-hole testing, the products are hermetically sealed with laminated tape to protect them from deterioration either from the humidity or from insects.

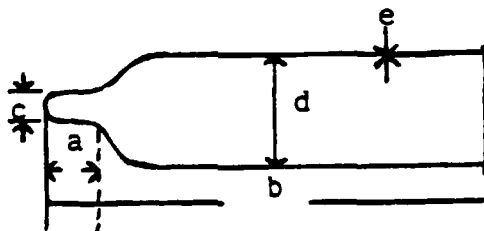
### Storage

Bulk condoms, sealed condoms, boxed condoms, chemicals, packaging materials and other materials are placed in the store-room. They are protected from humidity, heat and direct sunlight.

### Specifications and quality

#### Specifications

Figure XVI shows a typical profile of a condom. Several styles are available, however, at the first stage of production it is suggested that the standard type of condom should be produced in Turkey.



- |                              |                           |
|------------------------------|---------------------------|
| (a) Length of nipple:        | $15 \pm 5 \text{ mm}$     |
| (b) Total length:            | $190 \pm 10 \text{ mm}$   |
| (c) Circumference of nipple: | $15 \pm 3 \text{ mm}$     |
| (d) Circumference of centre: | $100 \pm 3 \text{ mm}$    |
| (e) Wall thickness:          | $0.045 - 0.08 \text{ mm}$ |

Figure XVI. Profile of a condom

### Materials

The main raw material, natural rubber latex, should be imported from Malaysia because this country produces a large quantity of latex and its production technology is well advanced compared with other latex manufacturers.

First-grade rubber is required for the production of high-quality condoms. When anti-stickiness agents, lubricants and colouring agents are used, they should be carefully checked for their ability not to irritate the skin.

Quality

(a) The thickness of a condom should appear even. It should not have cracks, pin-holes, bubbles and alien substances;

(b) The physical properties are outlined below:

- Tensile strength: > 200 kg/cm<sup>2</sup> (2,000 Pa)
- Elongation at break: > 700 per cent
- Tensile strength after aging: > 200 kg/cm<sup>2</sup> (2,000 Pa)
- Elongation at break after aging: > 700 per cent

Materials needed for condom production

Natural rubber latex

The quality of the natural rubber latex is specified in table 49. It should be imported from Malaysia.

Table 49. Specifications of centrifuged natural rubber latex

Specification	
Appearance:	Clean, milky-white colour
Total solid content:	61.0% (min by weight)
Dry rubber content:	60.0% (min by weight)
Difference between total solid and dry rubber:	2.0% (max by weight)
Ammonia content (on water phase):	1.0-2.3% (max)
Viscosity (B-type viscometer at 25 ± 1°C):	140 cp (max)
Volatile fatty acid (KOH g/100 g of solid):	0.1 (max)
Mechanical stability:	900 sec (min)
Coagulation	0.1% (max)
KoH value	0.8% (max)
pH value (at 25°C):	10.0-10.8
Cu	0.001% (max)
Mn	0.001% (max)

Chemicals

The following chemicals are used for compounding and for the analysis of the latex. Sulphur and zinc oxide produced in Turkey are considered satisfactory for this purpose; an analysis can be seen in table 50.

(a) Vulcanizing agent

Sulphur;

(b) Vulcanizing activator

Zinc oxide;

(c) Vulcanizing accelerator

There are many chemicals to accelerate vulcanization;

(d) Dispersing agents (imported)

To disperse natural rubber latex correctly, dispersing agents are necessary. Misuse might cause the compounded latex to become useless;

(e) Anti-oxidants (imported)

These chemicals are used to protect the latex from deterioration by aging;

(f) Stabilizers

Stabilizers are used to produce constantly high quality products;

(g) Special compounding ingredients (imported)

Each producer adds different chemicals to his product in order to make it unique in terms of quality and appearance;

(h) Other chemicals (partly imported, partly domestic)

Chemicals for analysis, water treatment, cleaning moulds, stripping the condoms from the moulds, protection against stickiness, to be used on testing machines, for the lubrication of condoms etc.

The quantity and use of the above-mentioned chemicals differ from producer to producer in accordance with the nature of the natural rubber latex, temperature, humidity, machinery, equipment etc.



Table 50. Analysis of sulphur and zinc oxide produced in Turkey

Content	Analysis
<u>Sulphur</u>	
Assay	99.99%
Heavy metals (as Pb)	0.0012%
Copper (as Cu)	0.0001%
Cadmium (as Cd)	0.0002%
Tin (as Sn)	0.0003%
Iron (as Fe)	0.0025%
Density	5.6
<u>Zinc oxide</u>	
Assay	99.9%

Source: Istanbul "Metal Oksit".

Packaging materials

- (a) Polyethylene laminated cellophane tape;
- (b) Polyethylene laminated aluminium tape;
- (c) It is also possible to use polyethylene laminated paper tape.

All the above materials are produced locally. A pharmaceutical company in Turkey uses the same kinds of tape for packaging medicines. The specifications of these tapes are shown in table 51.

Table 51. Quality of tapes for packaging

Type	Size (Microns)
<u>Polyethylene-cellophane laminated tape</u>	
Cellophane	20
Polyethylene	50
<u>Aluminium-polyethylene-cellophane laminated tape</u>	
Cellophane	20
Polyethylene	15
Aluminium foil	7
Polyethylene	40

Note: Internal diameter of the bobbin - 75 mm. Length of one roll - 500 m.

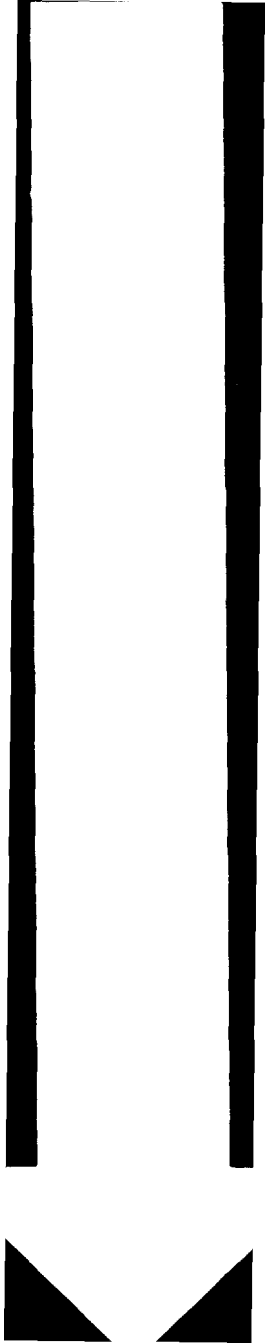
Water

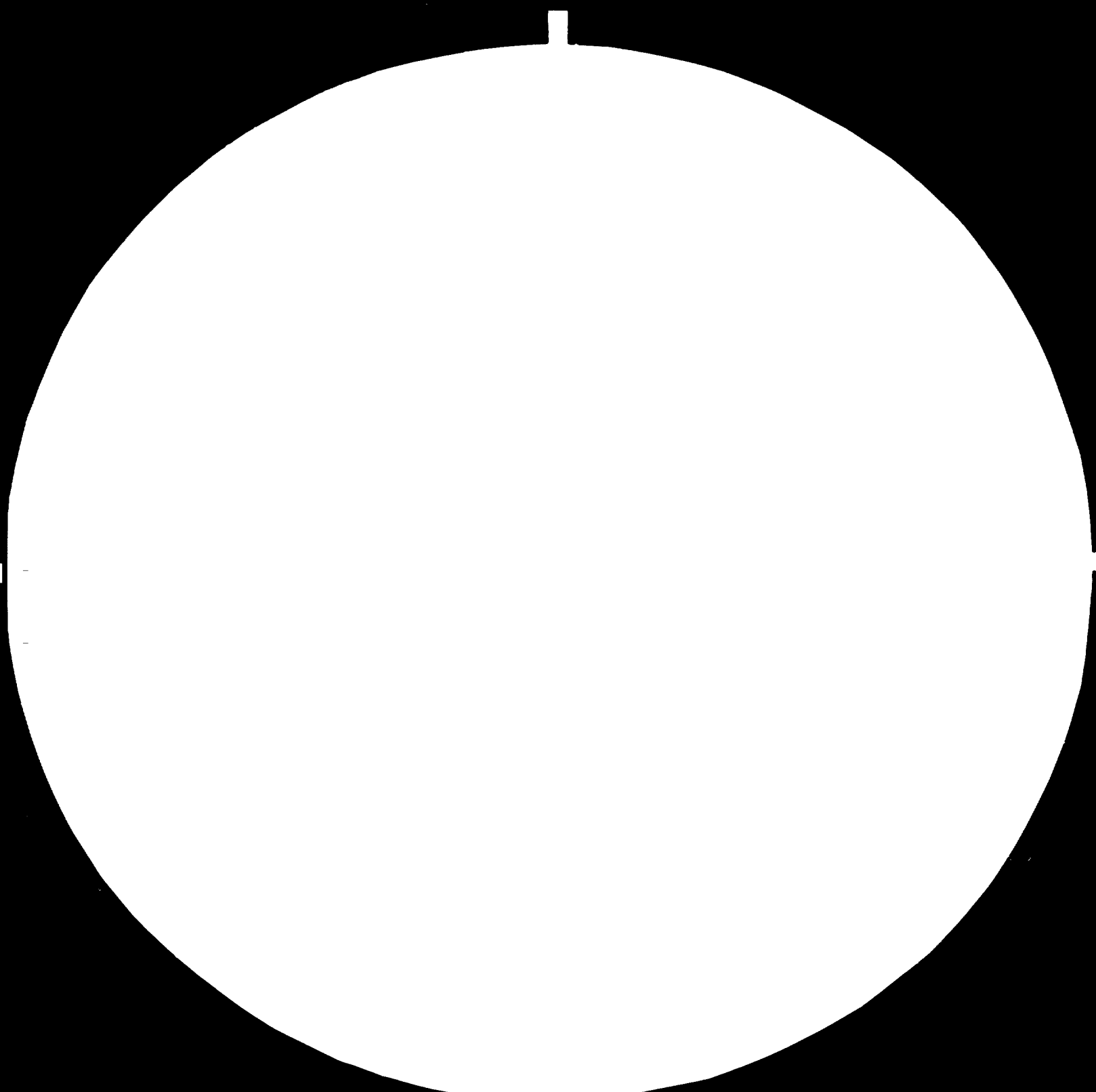
As a result of a shortage of city water it is necessary to dig a well in order to get the necessary water supply.

An analysis of the required supply is shown in table 52, and table 53 analyses city water in Manisa and Istanbul.

Table 52. Quality of water required

Feature	Analysis
Appearance	Transparent and non-coloured
pH	7.0-8.5
Total hardness (ppm as CaCO <sub>3</sub> )	110
Mg hardness (ppm as CaCO <sub>3</sub> )	50
Ca hardness (ppm as CaCO <sub>3</sub> )	70
Permanent hardness (ppm as CaCO <sub>3</sub> )	50
Temporary hardness (ppm as CaCO <sub>3</sub> )	60
Fe (ppm)	0.2
SiO <sub>2</sub> (ppm)	Lowest value possible
Specific electric conductivity (micromho/cm)	230
Temperature	Lowest temperature possible up to 20°C







3.2

3.6

4



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

On the other hand, we studied the quality of city water in the city, Manisa and Istanbul was studied.

Table 53. Analysis of city water in Manisa and Istanbul

Feature	Analysis	
	Manisa	Istanbul
Turbidity (ppm)	1.0	1.0
pH	7.6	7.3
Pressure	-	-
Total hardness (ppm as CaCO <sub>3</sub> )	148.5	72.0
Ca hardness (ppm as CaCO <sub>3</sub> )	103.0	54.0
Mg hardness (ppm as CaCO <sub>3</sub> )	45.5	18.0
Temporary hardness (ppm as CaCO <sub>3</sub> )	148.5	49.0
Permanent hardness (ppm as CaCO <sub>3</sub> )	0.0	23.0
Alkalinity (P)	0.0	0.0
Alkalinity (M) (ppm as CaCO <sub>3</sub> )	250.0	49.0
CL <sup>-</sup> (ppm)	11.8	15.8
SO <sub>4</sub> <sup>2-</sup> (ppm)	11.9	21.9
Iron (ppm as Fe)	0.03	0.03
SiO <sub>2</sub> (ppm)	-	-
Total dissolving solid (mg/lit)	419.0	145.65
KMnO <sub>4</sub> consumption (ppm as KMnO <sub>4</sub> )	20.0	24.0
Specific electric conductivity (micromho/cm)	558.7	194.2

Source: Mesuryu Laboratory.

Although city water at both sites satisfies requirements, further investigation is recommended since the quality of underground water in the two areas has not been studied.

Consumption of raw materials, energy and power

Consumption of raw materials, energy and power may differ from the types and characteristics of the plant supplied, but in general, considerable scope is allowed (see table 54).

Table 54. Consumption of raw materials, energy and power<sup>a/</sup>

Raw material	Consumption
Natural rubber latex	600-700 kg/day
Compounding chemicals	90-105 kg/day
Packing materials (laminated tape)	23,000-25,000 m/day
Powder and other chemicals	240-290 kg/day
Cleanders	7-9 kg/day
Electrical power	400-500 kW/hr
Water	15-20 ton/hr
Steam	1,200-2,000 kg/hr
Fuel (heavy oil)	120-180 l/hr

<sup>a/</sup>Calculated on 24 hours working time per day, for a production capacity of 552,000 gross per year (230 working days).

## XII. COMPANY ORGANIZATION

### Organization

#### Organizational chart

The organizational structure of a condom plant is shown in figure XVII. There are four departments which together consist of 16 sections.

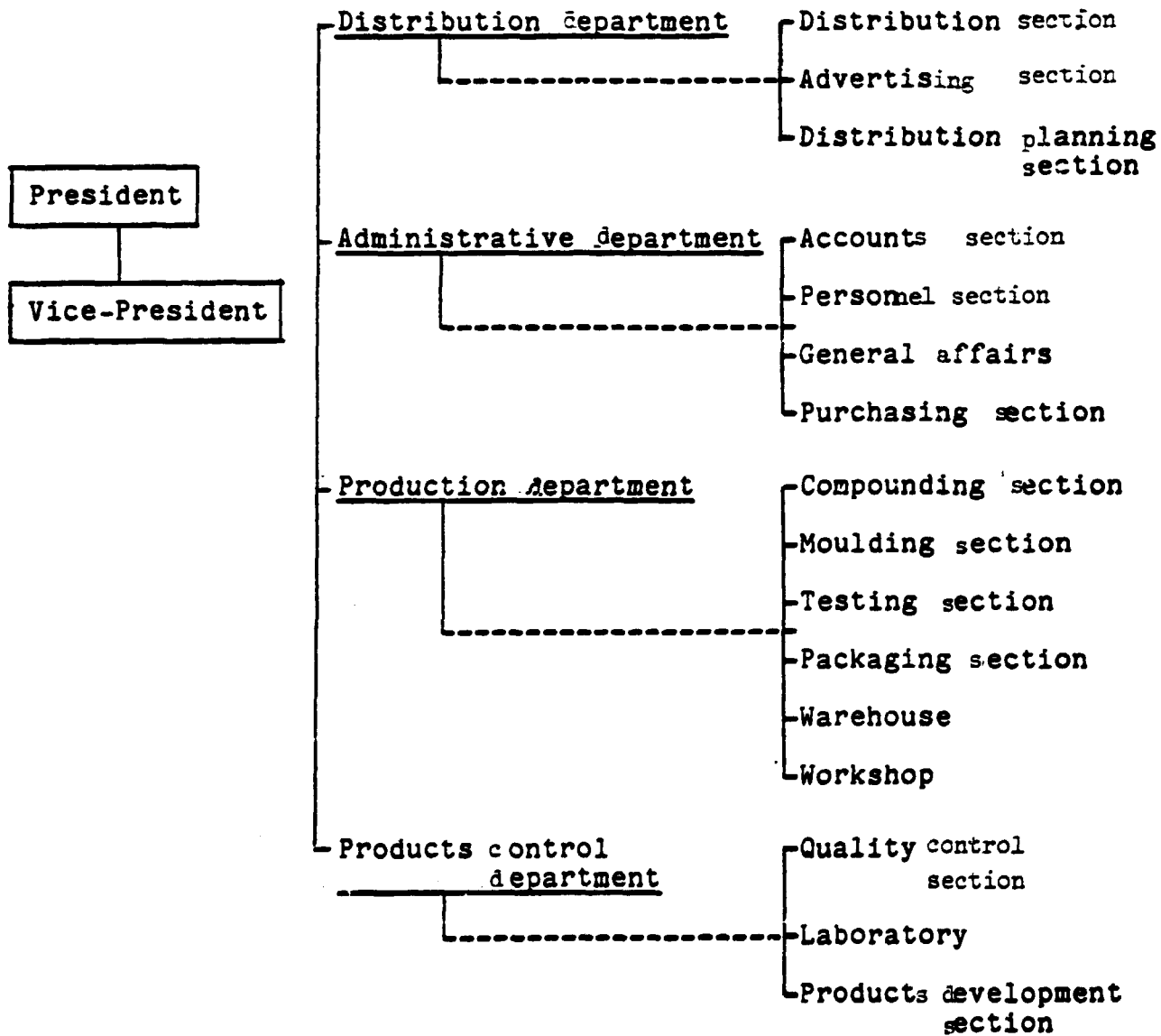


Figure XVII. Organizational chart for a condom plant



At the first stage of operation a product development section may not be required in the product control department.

#### Number of workers

The numbers of workers in each section are shown in table 55.

These figures are for a model condom plant, but the number is flexible depending on labour productivity. For example, in the packaging section, although the total number of staff is set at 52, the figure can be reduced to 40 by improving their skills. It may also be possible for one of the directors to hold another director's post.

#### Role of each department and section

##### Distribution department

This department consists of three sections: distribution, advertising and distribution planning.

##### Distribution section

The distribution section covers distribution through the public and private sector. According to the programme projected by the distribution planning section, the goods will be distributed through the public sector and be sold through the private sector. Their activities include:

- (a) Distribute products through non-profitmaking organizations and sell them through wholesalers of drugs, cosmetics and general merchandise;
- (b) Operations should follow normal business practices;
- (c) Market research and report to the distribution planning section.

##### Advertising section

This section promotes the use of condoms. It will advertise the products and their efficiency by the use of posters and catalogues, television and radio broadcasting, educational lectures and articles in magazines. It will also be responsible for public relations.<sup>23/</sup>

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<sup>23/</sup>Operational costs shown in chapter VII do not include advertising expense.

Table 55. Number of workers in a model company

Department and section	Directors		Managers		Supervisors		Technician engineers		Staff	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<u>Distribution</u>	1									
Distribution			1		2				3	2
Advertising			1						2	1
Distribution planning			1		1				1	
Sub-total	1		3		3				6	3
<u>Administrative</u>	1									
Accounts			1		1				3	2
Personnel			1		1				1	
Purchasing			1						1	1
Sub-total	1		3		2				5	3
<u>Production</u>	1									
Compounding			1		1				2	
Moulding			1		3				9	
Testing			1		2					30
Packaging			1		2					52
Warehouse			1		1				2	
Workshop (including boilerman)			1		1		4		2	
Sub-total	1		6		10		4		15	82
<u>Products control</u>	1									
Quality control			1				1		1	6
Laboratory			1				1		2	1
Products development			1		1		2		2	
Sub-total	1		3		1		4		5	7
<u>Total<sup>a/</sup></u>	4		15		16		8		31	95

<sup>a/</sup>The grand total is 176, and consists of 1 President, 1 Vice-President, 5 guards, 31 male employees and 95 female employees.

#### Distribution planning section

This section collects reports on marketing activities prepared by the distribution section and estimates the volume of condoms required. It then prepares a plan for production and distribution of the products.

#### Administrative department

The administrative department has no special requirements for its operation.

#### Production department

The production department is the most important in the company and is divided into the following six sections:

##### Compounding

- (a) Control of rubber latex for temporary use;
- (b) Control of chemicals for temporary use;
- (c) Compounding work;
- (d) Dispersing of compounded chemicals;
- (e) Vulcanization of compounded latex;
- (f) Control of compounded latex;
- (g) Keeping records of compounding works;
- (h) Delivery of compounded latex to moulding section;
- (i) Control of machinery and equipment being used in the compounding section;
- (j) Maintenance of equipment.

##### Moulding

- (a) Fill up dipping tank with compounded latex;
- (b) Operation of automatic moulding equipment;
- (c) Control of conditions for dipping, drying, rim rolling and stripping;
- (d) Delivery of produced condoms to rotary shifting machines;
- (e) Control of moulding equipment;
- (f) Operation of rotary shifting machines;

- (g) Control of drying conditions;
- (h) Control of rotary shifting machines;
- (i) Inspection of condoms;
- (j) Delivery of products to testing section;
- (k) Keeping records of condom production;
- (l) Maintenance of equipment.

#### Testing

- (a) Operation of electronic pinhole-testing machines;
- (b) Placing individual condoms on the moving metal moulds of the testing machines (by female workers);
- (c) Control of testing machines;
- (d) Delivery of tested condoms to the packaging section;
- (e) Keeping records of condom testing;
- (f) Maintenance of equipment.

#### Packaging

- (a) Lubrication of condoms;
- (b) Operation of packaging machines;
- (c) Packaging of bulk condoms in laminated tape;
- (d) Boxing packaged condoms, when required;
- (e) Inspection of packaged and boxed products.

#### Warehouse<sup>24/</sup>

- (a) Control of stored raw materials;
- (b) Control of stored condoms (bulk, semi-packed and boxed products);
- (c) Delivery of raw materials and packaging materials to each section:

---

<sup>24/</sup> Attention in the warehouse should be paid to the following for the purpose of storing products and materials in good condition:

- Temperature: Should be maintained at 5-25°C.
- Humidity: Should be normal.
- Lighting: Products and materials should not be in the direct rays of the sun.
- Rainfall: Products and materials should be protected from rain.

- (d) Delivery of bulk and semi-packed goods to packaging section;
- (e) Preparing shipment of products;
- (f) Control of warehouse equipment;
- (g) Maintenance of equipment.

#### Workshop

- (a) Control of electricity supply;
- (b) Control of steam supply;
- (c) Control of tools;
- (d) Checking of machinery and equipment;
- (e) Checking of electricity consumption;
- (f) Inspection of safety device;
- (g) Periodical inspection of machinery, equipment and spare parts;
- (h) Periodic cleaning of transformer;
- (i) Periodic exchange of electrical parts;
- (j) Periodic cleaning of boiler;
- (k) Repair of machinery and equipment;
- (l) Maintenance of generator;
- (m) Maintenance of boiler;
- (n) Maintenance and repair of plumbing;
- (o) Maintenance of machinery and electrical equipment;
- (p) Improvement of machinery and equipment;
- (q) Making economies in electricity consumption by improving efficiency of the facilities;
- (r) Making economies in steam consumption by improving efficiency of the facilities;
- (s) Taking measures to avoid pollution;
- (t) Storage of various parts, machinery and equipment.

#### Product control department

This department consists of the following three sections; it is independent of the production department, and its main responsibilities are as follows:

(a) Inspection of materials and products from each section, judgement of their quality separate from the quality checks carried out in each production section;

(b) Studying the possibility of improving products, cost of production and productivity from collected data;

(c) Developing new products for the future.

#### Quality control section

This section is responsible for the inspection of the quality of materials and products in each process in order to see whether they meet the defined standards and to assure the quality of the final product for the consumers. It also collects production data in order to continue to produce high quality goods and to indicate in the future an improvement in the quality of products, production costs and productivity. The quality control section is responsible also for the maintenance of laboratory equipment.

The processes performed by the quality control section consist of:

- (a) Inspection of compounded materials;
- (b) Inspection of moulded products;
- (c) Inspection of tested products;
- (d) Inspection of packed products;
- (e) Inspection of finished products before shipment.

The methods of testing condoms in order to judge their quality are as follows:

- (a) Water leakage test;
- (b) Electronic test;
- (c) Tensile strength test;
- (d) Elongation at break test;
- (e) Bursting volume test;
- (f) Aging test.

The first two tests are carried out in order to check porosity; the others measure various physical properties of condoms.

Of these methods, water leakage is the most important; inevitably the test results indicate the conditions of condom production in the factory.

#### Laboratory

This section inspects the quality of delivered natural rubber latex and chemicals before they are compounded. It also maintains laboratory equipment for its own use.

#### Product development section

In analysing data from the quality control section, this section seeks ways to improve the quality of condoms, production cost and productivity. It is also responsible for the development of new products.

### Labour control

#### Working hours

##### Distribution department and general affairs section

This department and section should work 8 hours each per day.

##### Products control

This department also should work 8 hours each day. Night-time production might be inspected in the daytime by this department.

##### Production department

The recommended working hours and shifts differ and depend on the section.

#### Compounding section

This section should work 8 hours each day (from morning to evening).

#### Moulding section

It is recommended that working hours in the moulding section be 24 hours a day on a continuous basis. Such an operation is for two reasons:

(a) Daily loss of compounded material is expected at the time of beginning and ending operations;

(b) Daily loss of working time is anticipated at the time of beginning and ending operations. (It is estimated that the weekly loss of working time may be more than 55 man/hours.)

As a result, three 8-hour shifts each day are recommended.

#### Testing section

In relation to the capacity of production in the moulding section, it is recommended that 16 hours of working time is needed in the testing section. Two shifts should be worked. Although the main work in this section depends upon women workers, night work by female staff is not forbidden in Turkey.

#### Packaging section

It is recommended that 16 hours of work daily be carried out in the packaging section. However, the operation can be adjusted in accordance with the delivery schedule and the method of packaging.

#### Workshop

Working hours should total 8 hours in this section as long as there is no sudden breakdown of machinery and equipment.

#### Boiler

Three shifts are needed of 8 hours each (24-h operation).

#### Warehouse

Working hours in the warehouse should be 8 hours each day.

#### Security

Three shifts of 8 hours each throughout the year are required.<sup>25/</sup>

---

<sup>25/</sup> Guards are an exception and their daily working hours may be changed according to the time and circumstances.



Terms of employment

Salaries, wages and fringe benefits

The recommended salaries, wages and fringe benefits of the company are based on the present level of income in Turkey (see table 44).

Salaries and wages increase nearly every month and the increase in labour costs must directly affect production costs. Therefore, an examination of wage levels in Turkey should be undertaken before the project begins.

Working days each year

The number of working days per year has been set at 230 days (365 - 135).

104 days (Saturdays and Sundays)

15 days (National holidays)

16 days (Paid holidays)

Education and training

Before the plant begins operations, it is necessary to train the technicians. The plant can then start operating immediately after being taken over.

Staff who need to be trained in order to run the factory smoothly are listed in table 56.

Table 56. Staff who require to be trained prior to commencement of operations

Status	Number
Director of production department	1
Manager of compounding section	1
Manager of moulding section	1
Manager of testing section	1
Manager of packaging section	1
Manager of quality control section	1
Manager of laboratory	1
Mechanical engineer	1
Electric engineer	1
Chemical engineer	1
Total	10

Company engineers

To ensure that machinery and equipment operate satisfactorily and that all staff have sufficient skill, it is strongly recommended that engineers from the company undertaking the project be sent to Turkey after the plant is installed.<sup>26/</sup>

These engineers include a chief co-ordinating manager and two technical engineers.

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<sup>26/</sup> The cost for travel expenses is not included in the estimated investment costs shown in chapter VII.

Annex

LIST OF PEOPLE WHO PROVIDED ASSISTANCE

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