

## **The social and economic outcome after upper limb amputation**

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### **Abstract**

This paper reports a study of 66 upper limb amputees in County Funen, Denmark who were visited in their homes by the author. The purpose of the study was to evaluate for the same period of time the social and economic outcome for a population of upper limb amputees compared with the normal population.

The number of amputees investigated corresponds to the annual number of persons becoming upper limb amputees in Denmark. The aetiology of registered amputees also corresponds to the Danish Amputation Register.

The amputees had become "better placed" in the social system after amputation independent of prosthetic use. The mean age of the amputees corresponded with the age where people reach their best social grouping. Their social migration quotient was higher than the background population and reflected the amputees better income and housing conditions. The reasons for these surprising results must be the high grade social system in a sophisticated industrial country. None of the amputees were required to pay for rehabilitation or prosthetic supply.

A lower divorce rate for the amputees was explained by a symbiosis between the amputees and their partners to protect their future existence. Only 14% lived alone.

Those who had their sexual debut after amputation were 3 years later in sexual experience than the rest of the amputees because of difficulties during the maturing process.

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### **Introduction**

The loss of an upper limb results in a major and sudden restriction of function, sensation and of cosmesis and can be a great socio-economic catastrophe for the individual.

The ratio of upper and lower limb amputees differs between countries. War has a great influence (Steinbach, 1986).

Denmark is a well developed country with a high grade social system. In Denmark upper limb amputations constitute 3% of all amputations. The annual number of upper limb amputations is 75 (62-82) compared to 2164 lower limb amputations (Ebskov, 1986; Andersen-Ranberg and Ebskov, 1988).

The primary purpose of this study was to evaluate the social and economic outcome for a population of upper limb amputees compared with the normal population in the same period of time.

### **Method**

The number of upper limb (UL) amputees in County Funen, Denmark was not known. The Amputation Register (Ebskov, 1986) could only count back to the year 1972. Therefore the material was collected from all the hospitals and prosthetic centres in the county. All registers were examined. The material therefore includes all amputees who are being or have been treated in the County of Funen in the period 1 January 1900 to 31 December 1987.

All amputees were visited in their homes by the author. This gave the opportunity to see and register their daily surroundings and function and meet their families.

Two sets of questionnaires were constructed. One for amputees under 18 years and one for amputees over 18 years.

The amputees were characterised as active

Table 1. Total number of upper limb amputees registered.

Cause of amputation	F	M	n	%
Trauma	4	49	53	50
Congenital	9	5	14	13
Brachialplexus lesion	1	5	6	6
Vascular disease	13	8	21	20
Tumour	4	7	11	11
Summation	31	74	105	100

users (i.e. active prosthesis more than 8 hours a day), partially active users (i.e. active prosthesis less than 8 hours a day), passive users (i.e. only users of a passive prosthesis regardless of time) and prosthetic non-users (i.e. no use of prosthesis at all).

The amputees were classified in social groups after the terms of the Danish Institute for Social Research (Enevoldsen *et al.*, 1980) and compared with the social groups of the background population. Children were placed in the social groups of their parents, and pensioners as a function of their education and work at retirement.

The mean time lapse from amputation to

Table 2. Number of upper limb amputees visited.

Cause of amputation	F	M	n	%
Trauma	3	40	43	65
Congenital	6	4	10	15
Brachialplexus lesion	1	5	6	9
Vascular disease	3	1	4	6
Tumour	1	2	3	5
Summation	14	52	66	100

completion of the investigation was 20.6 years. The year 1968 corresponds to the mean year of amputation. Therefore the commencement year 1968 and the year of completion 1988 were selected as the basic investigation years.

As the background population for the basic investigation years two comparable groups were selected. The two groups were respectively the Danish population and the age group in the population corresponding to the mean age of the amputees at amputation and at review.

## Results

Some 105 UL amputees were registered; 32

Table 3. The personal characteristics of the amputees and their school education and social education and social grouping at review.

Number Characteristic	26	6	16	18
	Active	Part. active	Passive	No prosthesis
Mean age in years at review	29.2	35.3	70.0	44.1
Mean time in years since amputation	13.8	8.3	46.5	12.3
Loss of dominant hand (%)*	68.4	83.3	43.8	40.0
Loss of elbow (%)**	15.4	0.0	31.3	38.9
School education mean years at review	9.8	8.8	6.5	7.9
Social grouping at review (%)				
	I	0.0	0.0	0.0
	II	8.0	17.0	13.0
	III	50.0	17.0	31.0
	IV	19.0	17.0	31.0
	V	13.0	50.0	25.0

\* Congenital amputees not included.

\*\* All congenital amputees had a 8–12 cm stump below elbow.

Social group classification:

- I Very large self-employed and top salaried employees
- II Major self-employed and major salaried employees
- III Minor self-employed and middle salaried employees
- IV Wage earners, skilled and minor salaried employees
- V Wage earners, unskilled

were dead and 7 would not participate (3 were in conflict with the hospital system, one had psychiatric reasons and 3 did not give any reasons) (Table 1).

Sixty-six amputees were visited in their homes by the author (Table 2). The mean age at amputation was 24.5 years (0–72 years). Mean age at review was 45.1 years (4–83 years). The mean time lapse from amputation to review was 20.6 years (0–63 years). Twenty-six were active prosthetic users, 6 were partially active prosthetic users, 16 were passive users and 18 did not use a prosthesis at all. Table 3 shows the personal characteristics of the amputees and their social grouping. Loss of dominant hand did not include those with deficiencies present at birth who are for convenience described as congenital amputees. There were no significant differences in the social grouping between the 4 functional prosthetic groups.

Amputation was traumatic in 65% of the cases. As the persons with plexus lesions are seen as traumatic amputations (Kejlää *et al.*, in press), 74% of the amputations were the consequence of trauma. Most accidents occurred in the industry involving unskilled or skilled workers and in the traffic affecting

youngsters without education. This explains why 70% of the amputees were placed in the two lower social groups when amputated (Fig. 1).

At review 20 years later the amputees had placed themselves in a better position in the social group system (Fig. 2). Compared to the background population the amputees had a higher social migration quotient for the same period of time. None of the amputees was placed in the social group 1 either at amputation or at review.

The employment status at amputation and at review for the amputees is shown in Figure 3. With time more amputees had become pensioners. Of the pensioners 65% were entitled to pension because of age, the rest were pensioners for other reasons not related to amputation (early retirement pension). There were no pensioners in the congenital and plexus groups. In the tumour and illness groups 86% (n=6) were pensioners. The background population included 18% pensioners (of which 73% were retired because of age, 27% had early retirement pension) at time of review.

The unemployment rate for the amputees was twice the unemployment rate in Denmark both in regard to the total population and the

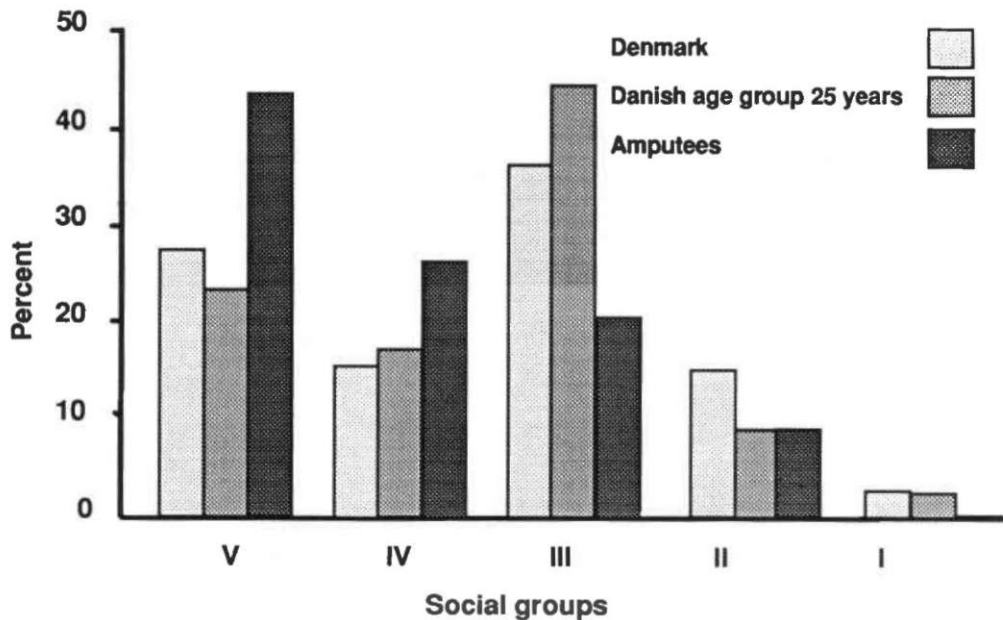


Fig. 1. The social grouping of amputees compared to the Danish population and the corresponding age group fitting the mean age for the amputees at amputation in percent (1968) (2.1% of the Danish population and 2.8% of the Danish corresponding age group could not be classified).

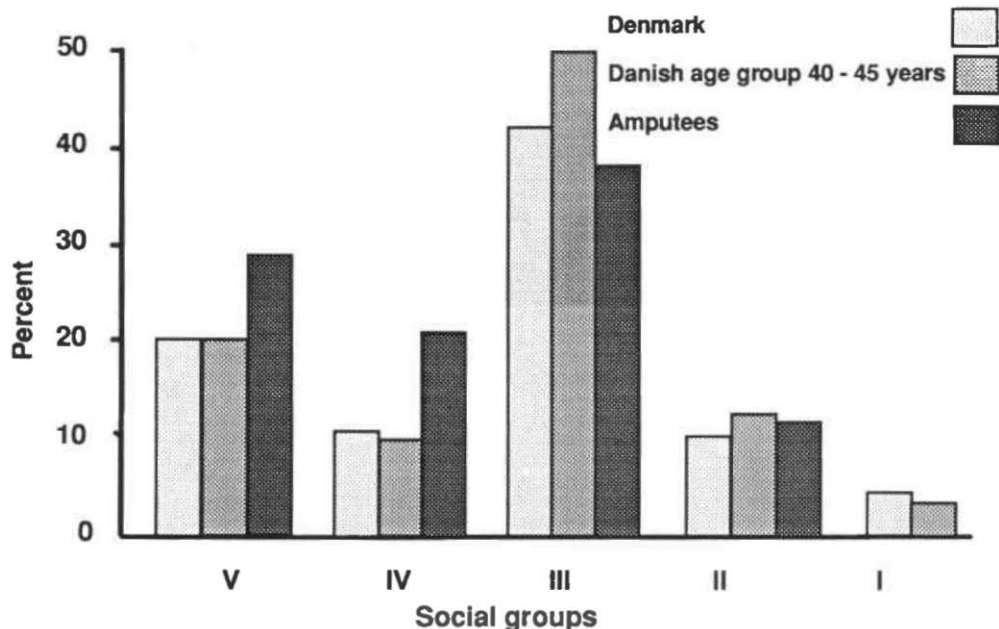


Fig. 2. The social grouping of amputees compared to the Danish population and the corresponding age group fitting the mean age for the amputees at review in percent (1988) (12% of the Danish population and 3.5% of the Danish corresponding age group could not be classified).

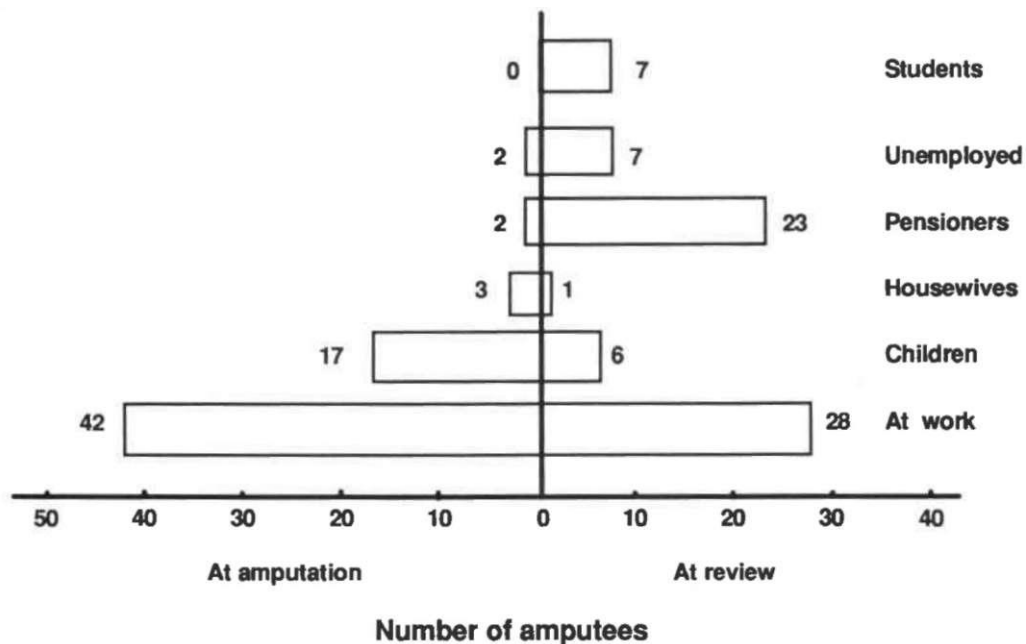


Fig. 3. The employment status of the amputees at amputation and at review.

total labour force. There has been an increase in the average unemployment status in Denmark from 0.7% to 8.7% from 1965 to 1988. This corresponds to the unemployment increase for the amputees.

The mean gross income for persons in Denmark was 128,800 Danish Kroner (DKK) (lower quartile 57,200, upper quartile 222,100 DKK) in 1986. The mean gross income for the amputees at review was 137,900 DKK. (39,000–480,000 DKK).

Seventy-six percent ( $n=37$ ) of those who had a traumatic cause of amputation were entitled to an insurance payment. The amount became index regulated in 1964. The mean amount was 220,000 DKK (36,000–540,000 DKK). The insurance amount was in most instances paid out in instalments until the amputee became a pensioner and then the balance was paid.

Dwellings, households and persons by type of building and number of rooms are shown in Figures 4 and 5. A greater number of amputees than the background population lived in one-family houses and their dwellings had more rooms. The mean floor space for the amputees was 115 square metres (12–460 square metres) against 102 square metres (39–>300 square metres) for the background population. Of the

amputees 77% owned their houses against 56% of the background population.

Most families in Denmark have 2–3 children. Only 2% have more than 5 children. There were fewer amputee families with 2–3 children, but more with 5–6 children. The number of occupants of dwellings were the same for the background population and the amputees.

The divorce rate in Denmark is today about 50%. The mean divorce rate in Denmark concerning the period from the earliest marriage for the amputees to completion of the investigation was 23% (7–46%). The divorce rate for the amputees was 11% (4 out of 37 marriages).

Only 14% of the amputees lived alone against 28% in the background population. Six were children. The first sexual experience was in mean 3 years later (1.8–6.4 years) for 12 amputees who had their sexual debut after amputation compared with 48 amputees who had their first sexual experience before amputation.

#### Discussion

The number of investigated amputees corresponds to the annual number of persons

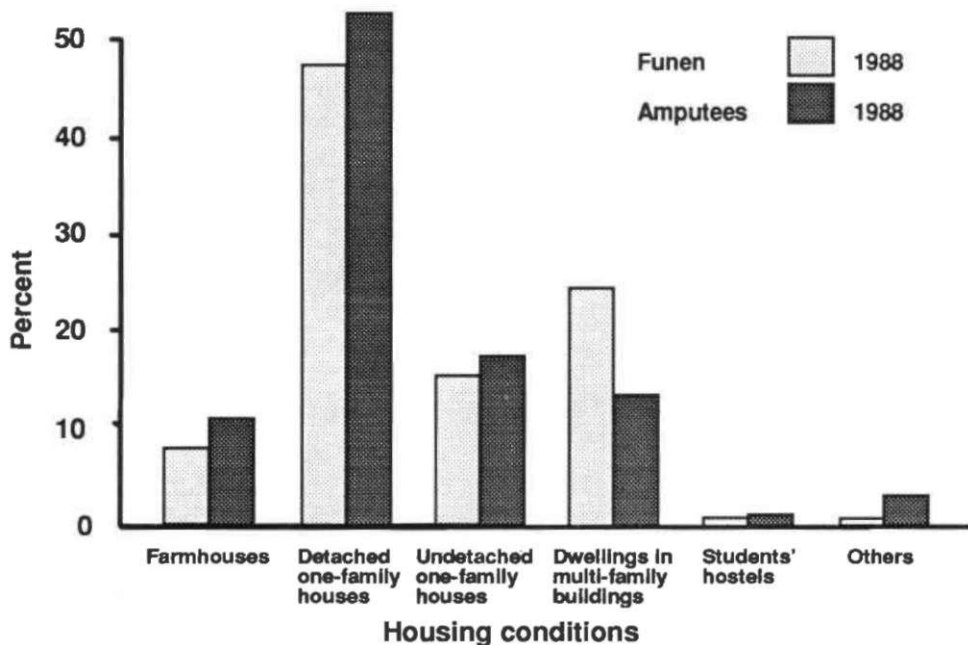


Fig. 4. Dwelling stock by type of building in percent. Amputees compared with the condition for the County Funen.

who become UL amputees in Denmark. The aetiology for the registered amputees corresponds well with the distribution of the Amputation Register (Ebskov, 1986; Andersen-Ranberg and Ebskov, 1988).

It is of interest that the amputees independent of prosthetic use had become better placed in the social system than before amputation. In this regard it is important to remember that the majority will not reach their best social group until the age of forty. This corresponds well with the mean age of 45.1 years in this investigation.

The social laws have changed with the development of society and have become more profitable for the individual. The good social system in Denmark has been of great importance for the amputees. All have had the opportunity to become rehabilitated. For the amputees there has been no cost in regard to rehabilitation or prosthetic supply. Another important factor is the education level in Denmark. Most amputees had an education of a minimum of 7 compulsory school years. It has been shown (Andersson and Berg, 1975) that low age and good education were positive factors for successful rehabilitation. This corresponds well with this investigation.

The insurance amount has been of supporting value for those who became amputees in an

accident or at work. This gave the amputees a guarantee for rearrangement of their lives and therefore a good outcome of rehabilitation.

The higher social migration quotient for the amputees must be seen as a consequence of the above mentioned facts.

The higher income for the amputees must be explained by their better social grouping and their mean age at time of investigation, which again explains their better housing conditions. The high number of pensioners is a consequence of age and the higher number of persons with illnesses and tumours in relation to the background population.

The unemployment increase for the amputees was a reflection of the current unemployment increase in Denmark.

The low divorce rate must be understood as a symbiosis between the amputees and their partners producing a dependence secured by a stable relationship to protect future existence. This corresponds with the fact that only 14% of the amputees lived alone.

Sexual debut was 3 years delayed as a consequence of amputation and this delay must be explained by a difficult age with insecurity and fear, which disappear with the ripening process not only of the amputee, but of the counterparts.

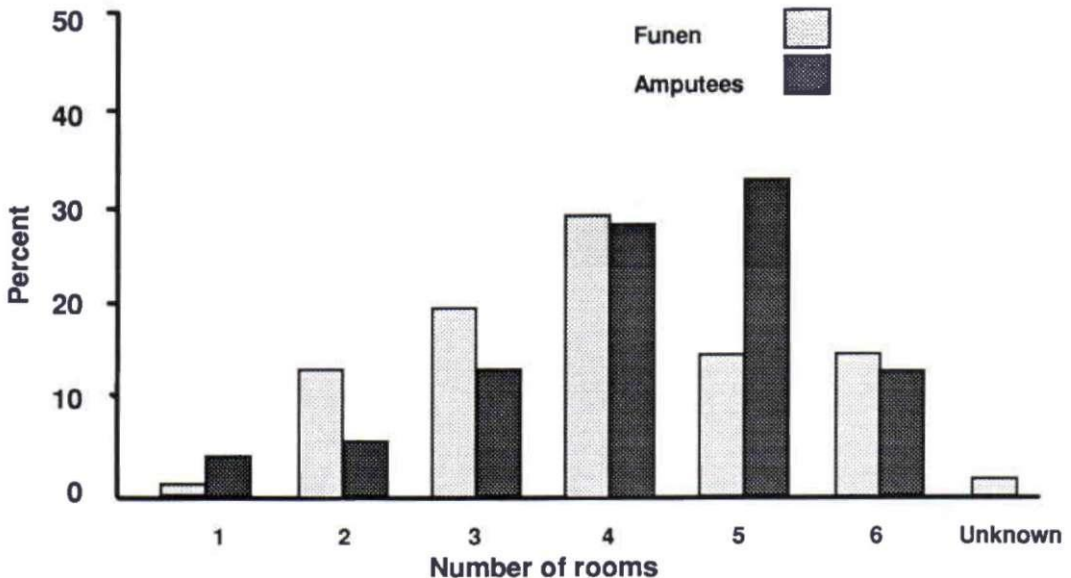


Fig. 5. Dwelling stock by number of rooms in percent. Amputees compared with the condition for the County Funen.

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