

R.J.M. PERENBOOM, L.M. VAN HERTEN, H.C. BOSHUIZEN and
G.A.M. VAN DEN BOS

TRENDS IN LIFE EXPECTANCY IN WELLBEING

(Accepted 15 November 2002)

ABSTRACT. *Objectives:* This paper describes and discusses trends in life expectancy in wellbeing between 1989 and 1998. *Methods:* Data on wellbeing by the Bradburn Affect Balance Scale is obtained from the Netherlands Continuous Health Interview Surveys for the calendar years from 1989 to 1998. Using Sullivan's method, life expectancy in wellbeing is calculated. *Results:* For males at the age of 16, life expectancy in wellbeing increases significantly from 52.7 years in 1989 (90.1% of the total life expectancy) to 54.4 years in 1998 (90.8%). This increase is almost completely caused by the increase in total life expectancy. For females at the age of 16, life expectancy in wellbeing raises significant from 54.4 years in 1989 (84.1%) to 56.2 years in 1998 (86.3%). This increase is almost completely caused by a decrease in the number of years in a state of distress. For both males and females at the age of 65, the significant increase of life expectancy in wellbeing exceeds the increase in total life expectancy and is mainly caused by the decrease in number of years in distress. *Conclusion:* Contrary to life expectancy in good perceived health and to disability free life expectancy – which show a decreasing trend – the overall wellbeing of the population is increasing. It seems that aspects in human life that contribute to wellbeing or quality of life other than physical health are gaining in importance. This makes life expectancy in wellbeing a less appropriate instrument to monitor changes in population health, but a useful instrument to measure population quality of life.

KEY WORDS: life expectancy, wellbeing

INTRODUCTION

With the ageing of society, mortality figures and derived indicators like total life expectancy are loosing in health policy relevance, because they do not take into account the increasing impact of non-lethal, chronic-degenerative diseases and consecutive loss of quality of life and wellbeing. Health expectancies are relatively new indicators combining data on mortality and morbidity and thus provide a better insight into the health status of the population. In



Social Indicators Research **65**: 227–244, 2004.

© 2004 Kluwer Academic Publishers. Printed in the Netherlands.

this indicator, total life expectancy is divided in years in a state of "good" health and a state of "ill" health. Until now health expectancies have been assessed in terms of (chronic) diseases, disabilities and perceived health, reflecting the national health statistics where attention is focused on the traditional measures of physical health: diseases and disabilities (Robine, Romieu, Cambois, van de Water, Boshuizen and Jagger, 1995; Perenboom, van Oyen and Mutafova, 2002). The concept of quality of life or wellbeing is introduced to cover a more encompassing concept of health to assess the impact of diseases and disabilities. In patient related studies the inclusion of instruments to measure quality of life is normal practice, in population health interview surveys, the inclusion of instruments to measure wellbeing on a regular base is rare. In the Netherlands however, data on wellbeing are collected on a continuous basis in the Health Interview Survey. An extensive literature research in Medline revealed that no studies on the health expectancies in wellbeing have been conducted so far, so this study is the first to present the life expectancy in wellbeing. Because these data are collected since 1989 on a continuous basis, we can also present results of trend analyses.

This article aims at a description and discussion on trends in life expectancy in different states of wellbeing in the Netherlands between 1989 and 1998 for males and females at the age of 16 and at the age of 65 years.

DATA AND METHODS

Life expectancy in wellbeing is the number of years the average person of a certain age can expect to live in wellbeing. To calculate life expectancy in wellbeing, two types of data are needed: data on total life expectancy and data on the prevalence of different states of wellbeing (by age and gender). Sullivan's method is used to calculate the life expectancy in wellbeing (Sullivan, 1971a; Sullivan, 1971b; Jagger, 1997). Using age-specific mortality figures for a particular year, life expectancy is calculated for an artificial cohort. For each age interval, this produces the number of person years that this cohort will live in that interval. Using the age and gender

specific prevalence of wellbeing, this number of person years is then divided into years in wellbeing and in years in its counterpart, the state of distress. The life table approach means that the results are independent of the composition of the population and can therefore be compared to results in other populations or over time (assuming that the same type of health data is used) (Boshuizen and van de Water, 1994; Jagger, 1997). Mortality data to calculate total life expectancy is obtained from Statistics Netherlands (CBS, 1990 to 1999).

Age and gender specific prevalence of different states of wellbeing is measured with the Bradburn Affect Balance Scale (ABS) (Bradburn and Caplovitz, 1965; Bradburn, 1969; Furer et al., 1995). Age specific prevalence is based on age groups, starting with the age group of 16 upto and including 19 years, and then in 5 year groups (20–24, 25–29 and so forth to 85 plus and older). Although developed in the second half of the sixties, the ABS is still used to measure wellbeing at a population level in national health statistics. Translation into other languages still takes place (Devins et al., 1997). The Bradburn Affect Balance Scale consists of 10 items; 5 items referring to positive feelings (often called Positive Affect Scale, PAS) and 5 items referring to negative feelings (often called Negative Affect Scale, NAS). In the original version, all replies are dichotomous (yes/no). However, since its initial development, the number of questions used, the wording and the response categories have varied between studies (Bowling, 1997; Furer et al., 1995). In the Netherlands, the number of questions of the ABS in different studies ranged from 8 to 10, and the number of response categories varied from 2 to 7. Studies revealed that the correlation between the 5 negative formulated items (NAS) and other instruments measuring negative feelings is good; the validity of the PAS however remains subject to discussion (Heydendaal et al., 1986; Furer et al., 1995). Based on these studies, since 1989 the Netherlands Continuous Health Interview Survey has included the 5 items concerning negative feelings – always in the same formulation –, and therefore only these items could be used in this study.

In this study, for the trend analysis data is used from the years from 1989 to 1998. In 1989, the Health Interview Survey included almost 9,000 non-institutionalised persons. This response

is about 58.5% of the total sample. In 1998, 9,300 respondents have completed the Health Interview Survey, a response of about 60%. This figure is comparable to other interview surveys in the Netherlands. Non-response due to refusals decreased between 1989 from 28% to 25% in 1995. Non-response due to not being at home has increased from 9.6% in 1989 to 10.7% in 1995. To be representative for the Dutch non-institutionalised living population, the data is weighted by taking sociodemographic characteristics of the Dutch population into account (Statistics Netherlands, 1996). Trend analysis over the years 1989 to 1998 is performed by a linear regression analysis, weighted using the inverse of the squared standard errors for each year (Wilkins et al., 1994).

The response categories to the five included items (see Table I) are "not at all", "sometimes", "often" and "very often".

If a respondent answers "not at all" or "sometimes" on all five items, he or she is considered to be in wellbeing. If a respondent answers "often" or "very often" on at least one of the questions, he or she is considered to be in distress. To distinguish between different states of distress, a respondent who answers on one item "often" or "very often" is considered to be in a state of mild distress. A respondent who answers on at least two items "often" or "very often" is considered to be in a state of serious distress. As the ABS is only administered to people of 16 years and over, the life expectancy in different states of wellbeing is calculated and presented from this age. In this article, results are also shown for males and females at the age of 65 years.

The Netherlands Health Interview Survey does not include the institutionalised population, that is the population in residences for the elderly or nursing homes. Other data sources for the institutionalised population do not measure wellbeing. For our calculations, we assume the gender-age specific prevalence of wellbeing in the institutionalised population to be the same as in the independently living population, which is covered by the Health Interview Survey.

TABLE I

Five negative formulated items of the Affect Balance Scale as included in the Netherlands Health Interview Survey

Dutch version (Statistics Netherlands)	English translation (original American version, 1969) (Furer, König-Zahn and Tax, 1995)
Heeft u zich de afgelopen weken wel eens erg eenzaam en verlaten gevoeld?	During the past few weeks did you ever feel very lonely or remote from other people?
Heeft u zich de afgelopen weken wel eens zo rusteloos gevoeld dat u bij wijze van spreken niet stil kon blijven zitten?	During the past few weeks did you ever feel so restless that you couldn't sit long in an chair?
Heeft u zich de afgelopen weken wel eens erg verveeld?	During the past few weeks did you ever feel bored?
Heeft u zich de afgelopen weken wel eens erg terneergeslagen gevoeld of ergens over in de put gezeten?	During the past few weeks did you ever feel depressed or very unhappy?
Heeft u zich de afgelopen weken wel eens van streek gevoeld omdat iemand een aanmerking op u maakte?	During the past few weeks did you ever feel upset because someone criticized you?
Responsmogelijkheden: • Helemaal niet • Soms • Vaak • Erg vaak	Response categories: • Not at all • Sometimes • Often • Very often

RESULTS

Table II presents the results of the calculations at the age of 16. Table III presents the results for the age of 65 years. In Figure 1 to 4, the results of the trend analysis are presented in a graphical way.

In Figure 1 (and 3) the upper line represents the total life expectancy, while the lowest trend line represents the number of years in wellbeing. The distance between the upper line and the second line

TABLE II

Total Life expectancy, life expectancy in distress, life expectancy in wellbeing (absolute and relative), for males and females at age 16 between 1989 and 1998 in the Netherlands

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
<i>Males</i>										
Total LE	58.5	58.7	58.9	59.1	58.8	59.3	59.3	59.3	59.8	59.8
LE in wellbeing	52.7	52.3	52.2	53.0	52.4	53.0	52.6	52.9	53.9	54.4
LE in distress	5.8	6.4	6.7	6.1	6.4	6.3	6.7	6.4	5.9	5.5
Of which in light distress	3.6	4.2	4.4	3.8	4.1	4.0	4.4	4.1	3.8	3.7
Of which in serious distress	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.1	1.8
Standard error	0.31	0.36	0.37	0.32	0.33	0.32	0.32	0.34	0.31	0.33
LE in wellbeing as % of total LE	90.1	89.0	88.6	89.7	89.1	89.5	88.7	89.2	90.2	90.8
<i>Females</i>										
Total LE	64.6	64.8	64.8	64.9	64.6	64.9	64.9	64.9	65.1	65.2
LE in wellbeing	54.4	53.8	54.5	54.4	54.3	54.4	54.6	54.4	56.1	56.2
LE in distress	10.3	11.0	10.3	10.6	10.4	10.5	10.3	10.5	9.0	9.0
Of which in light distress	5.6	6.0	5.3	5.7	5.7	5.2	5.4	5.5	4.8	5.2
Of which in serious distress	4.7	5.1	5.1	4.9	4.7	5.3	5.0	4.9	4.1	3.8
Standard error	0.39	0.43	0.44	0.40	0.41	0.39	0.38	0.41	0.38	0.41
LE in wellbeing as % of total LE	84.1	83.0	84.0	83.7	84.0	83.8	84.1	83.8	86.2	86.3

refers to the number of years in serious distress and the distance between the second line and the lowest line to the number of years in mild distress. In Figure 2 (and 4) the distance between the 100% line and the upper trend line represents the proportion of total life expectancy that is spent in serious distress, while the lowest trend line represents the proportion of total life expectancy that is spent in wellbeing. The distance between the upper trend line and the second trend line represents the proportion that is spent in mild distress.

TABLE III

Total Life expectancy, life expectancy in distress, life expectancy in wellbeing (absolute and relative), for males and females at age 65 between 1989 and 1998 in the Netherlands

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
<i>Males</i>										
Total LE	14.3	14.4	14.5	14.7	14.4	14.8	14.7	14.7	15.0	15.1
LE in wellbeing	12.3	12.1	12.7	12.6	12.5	13.0	12.5	13.2	13.7	14.2
LE in distress	1.9	2.3	1.8	2.1	1.9	1.8	2.2	1.5	1.3	0.9
Of which in light distress	1.5	1.8	1.3	1.6	1.4	1.5	1.8	1.2	1.1	0.8
Of which in serious distress	0.4	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.1	0.1
Standard error	0.22	0.26	0.24	0.23	0.22	0.22	0.21	0.21	0.19	0.19
LE in wellbeing as % of total LE	86.4	83.9	87.3	85.7	87.1	88.1	85.1	89.8	91.4	94.2
<i>Females</i>										
Total LE	18.9	19.0	19.0	19.1	18.8	19.1	19.1	19.0	19.2	19.2
LE in wellbeing	14.6	14.8	14.7	15.1	15.3	15.3	15.5	15.0	16.6	17.1
LE in distress	4.3	4.1	4.3	4.0	3.5	3.8	3.5	4.0	2.6	2.1
Of which in light distress	3.1	3.2	2.8	3.1	2.4	2.9	2.5	3.0	2.0	1.9
Of which in serious distress	1.2	0.9	1.5	1.0	1.1	0.9	1.0	1.0	0.6	0.2
Standard error	0.26	0.28	0.29	0.25	0.26	0.25	0.24	0.28	0.25	0.25
LE in wellbeing as % of total LE	77.3	78.2	77.5	79.0	81.4	80.3	81.5	78.9	86.4	89.1

In 1989 males of age 16 can expect to live for another 58.5 years. Of these years, 52.7 can be expected to be in wellbeing and 5.8 in distress (distance between upper trend line and lowest line at year 1989). The number of years in wellbeing accounts for 90.1% of the total life expectancy. In 1998 life expectancy has significantly risen to 59.8 years ($p < 0.000$). The number of years in distress has decreased to 5.5 ($p = 0.5$), while life expectancy in wellbeing has significantly increased to 54.4 years ($p = 0.01$) (Figure 1). Of the

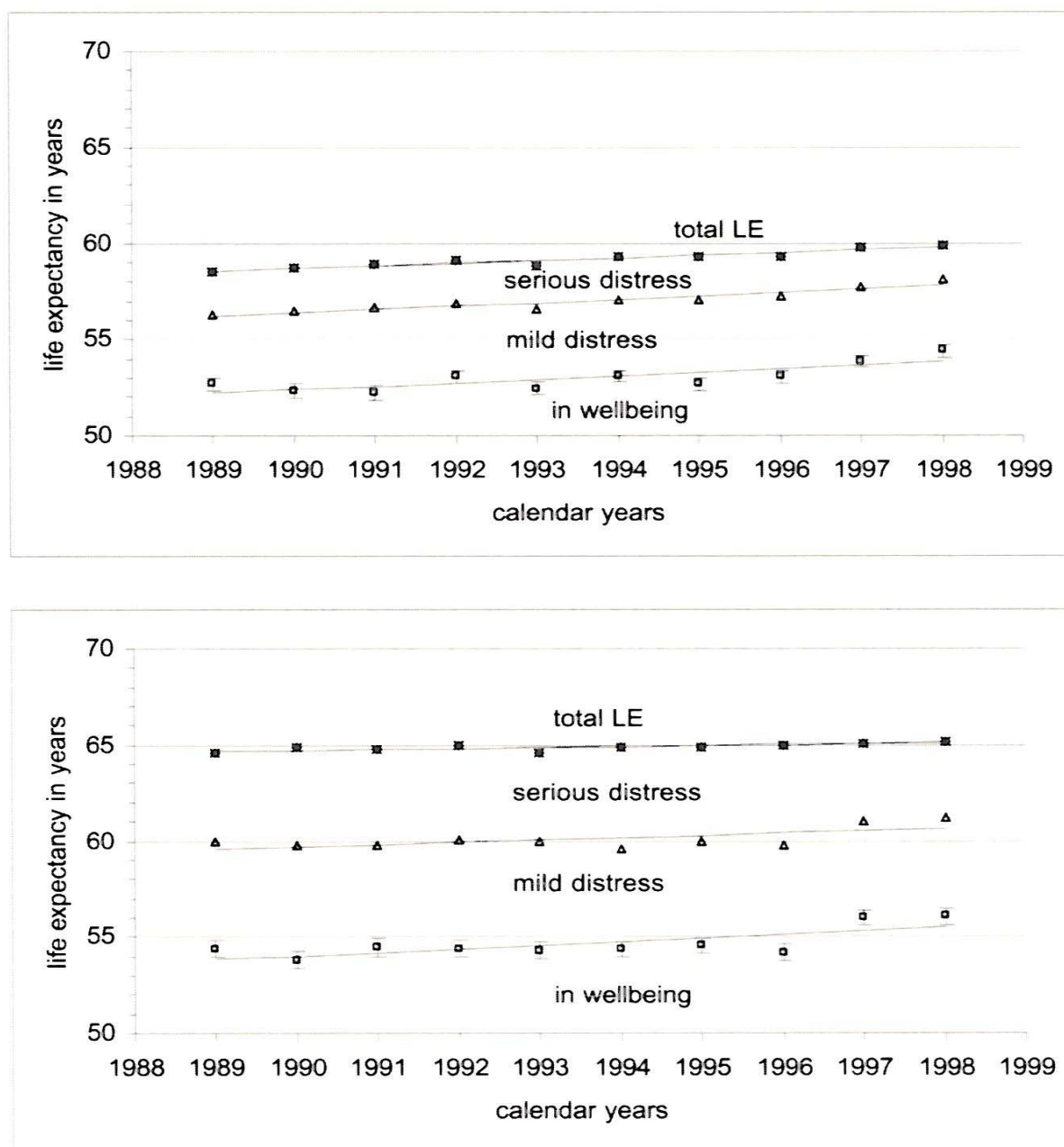


Figure 1. Total Life expectancy, life expectancy in distress, life expectancy in wellbeing, for males (above) and females (below) at age 16 between 1989 and 1998 in the Netherlands.

life expectancy in distress, the number of years in mild distress has not changed (distance between lowest line and second line), but the number of years in serious distress has reduced significantly (from 2.2 years to 1.8 years) (distance between upper line and second line). Seen as a proportion of the total life expectancy, the life expectancy in wellbeing shows only a slight, insignificant increase to 90.8% ($p = 0.3$) (Figure 2). In 1989 males at the age of 65 have a total

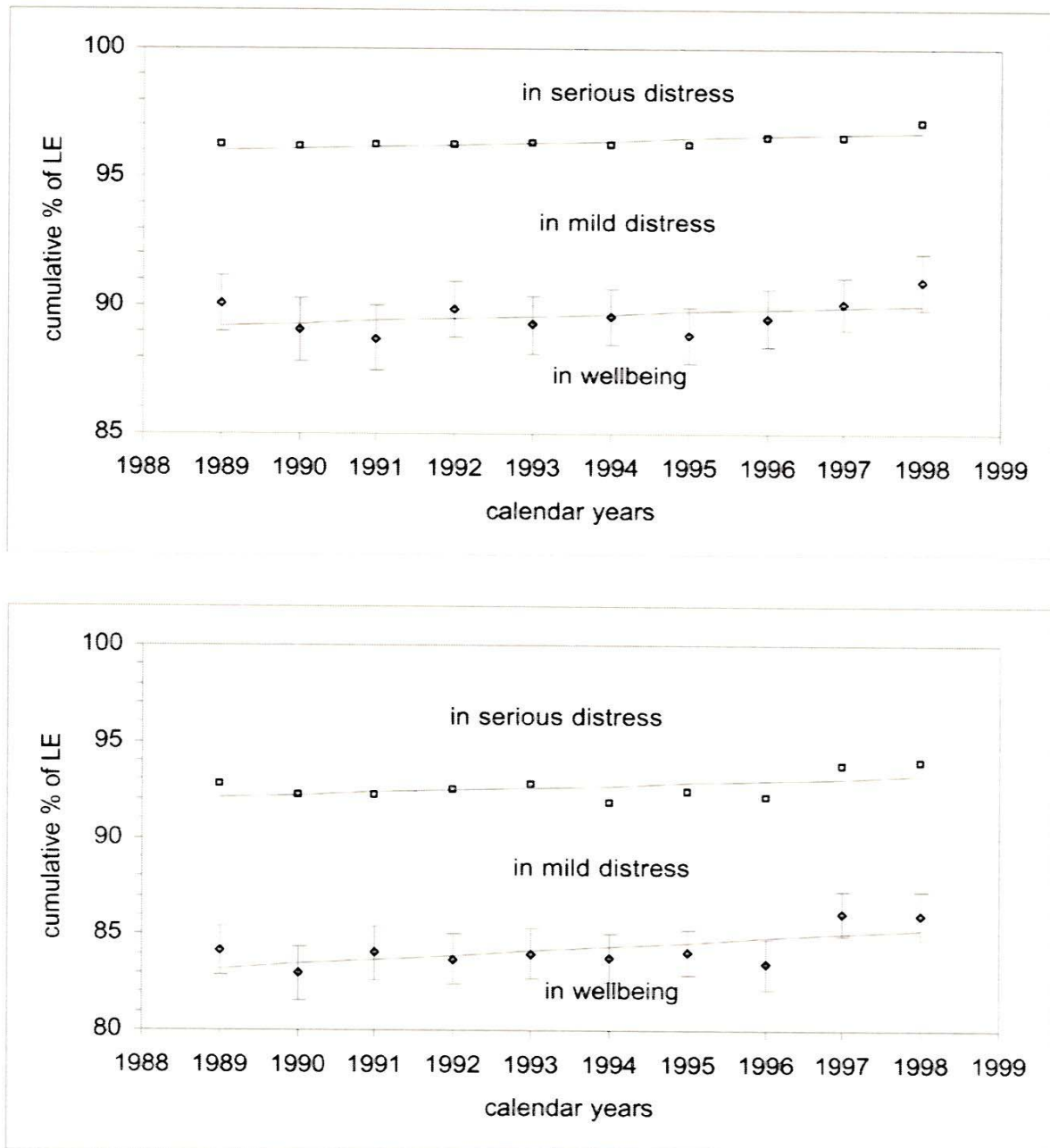


Figure 2. Life expectancy in distress and life expectancy in wellbeing as a proportion of total life expectancy, for males (above) and females (below) at age 16 between 1989 and 1998 in the Netherlands.

life expectancy of 14.3 years, of which 12.3 years in wellbeing and 1.9 years in distress (Table III, Figure 3). The years in wellbeing account for 86.4% of the total life expectancy. In 1998, the total life expectancy has significantly increased with 0.8 years to a total of 15.1 years ($p < 0.000$). The number of years in wellbeing has significantly increased to 14.2 years ($p < 0.000$), while the number of years in a state of distress has significantly decreased to 0.9

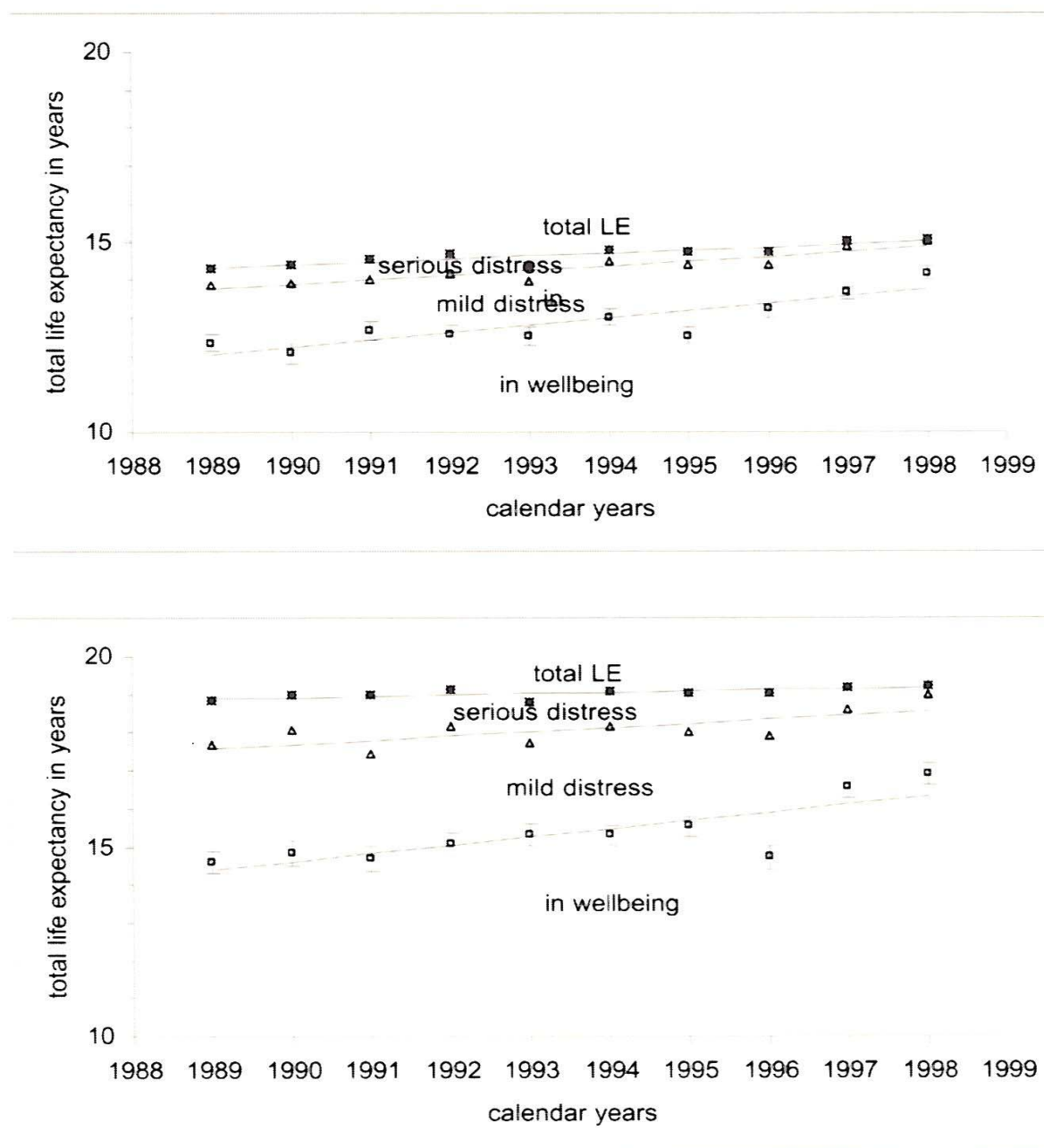


Figure 3. Total Life expectancy, life expectancy in distress, life expectancy in wellbeing, for males (above) and females (below) at age 65 between 1989 and 1998 in the Netherlands.

years ($p < 0.01$). This decrease in number of years in distress is the result of a significant decrease in the number of years in mild distress combined with a significant decrease in the number of years in serious distress. In a relative sense, life expectancy in wellbeing has significantly risen to 94.2% of the total life expectancy ($p < 0.01$) (Figure 4).

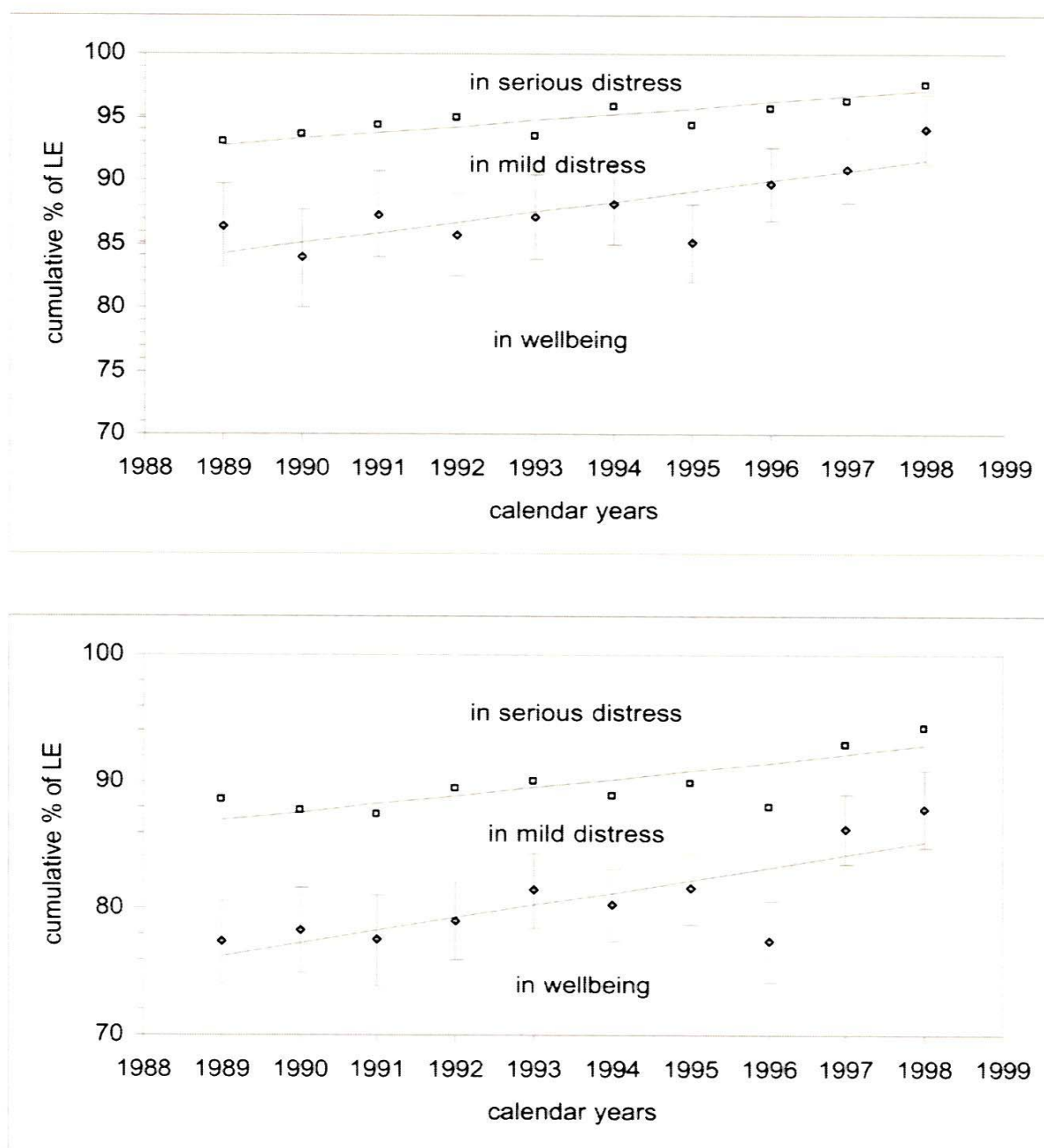


Figure 4. Life expectancy in distress and life expectancy in wellbeing as a proportion of total life expectancy, for males (above) and females (below) at age 65 between 1989 and 1998 in the Netherlands.

For females at age 16, total life expectancy in 1989 is 64.6 years (Table II). Of these 64.6 years, 10.3 years are to be expected in distress and 54.4 years in wellbeing (84.1% of the total life expectancy). In 1998, life expectancy at age 16 has risen to 65.2 years ($p = 0.006$), while life expectancy in distress has decreased to 9.0 years ($p = 0.03$). The number of years in mild distress shows a significant decrease; life expectancy in serious distress shows no significant

changes between 1989 and 1998. Life expectancy in wellbeing has increased significantly from 54.4 years to 56.2 years ($p = 0.009$) (Figure 1). This is a significant increase from 84.1% in 1989 to 86.3% in 1998 ($p = 0.02$) (Figure 2). At the age of 65, in 1989 females can expect to live another 18.9 years (Table III). Of these 18.9 years, 14.6 years are years in wellbeing (77.3%) and 4.3 years are in distress (22.7%) (Figures 3 and 4). In 1998, total life expectancy has increased with only 0.3 years to 19.1 years ($p < 0.02$). However, life expectancy in wellbeing has increased with 2.5 years to 17.1 years ($p < 0.05$), while the number of years in distress has decreased with 2.2 years to 2.1 years ($p < 0.05$). Both the number of years in mild distress and the number of years in serious distress show a significant decrease between 1989 and 1998. Due to the small increase in total life expectancy, the years in wellbeing as a percentage of total life expectancy has risen to 89.1% ($p < 0.01$).

By subtracting the results in Table III (age 65) from the results of Table II (age 16), one can calculate the years in wellbeing and distress for the age group between 16 to 65 years. At the age of 65, both males and females experience an increase in the proportion of total life expectancy spent in a state of wellbeing from 8 respectively 12 percent, while the proportion is stable in the age group between 16 and 65 years of age.

DISCUSSION AND CONCLUSION

In this article healthy life expectancies are assessed in terms of wellbeing for the years 1989 to 1998. The results show first that at the age of 16 years, total life expectancy for males has increased with 1.3 years, while for females the increase seems to stagnate with a rise of only 0.3 years. For both males and females at the age of 16 years, there is a significant increase in life expectancy in wellbeing over the years. For males, this increase is almost completely caused by the increase in total life expectancy, as can be concluded from the insignificant decrease of years in distress. For females however, the increase in number of years in wellbeing is caused mainly by the significant decrease in the number of years with distress. This decrease is mainly caused by a significant decrease in years with serious distress, while the number of years with mild distress stays

rather stable over the years. The significant increase in good years for females at the age of 16 is also reflected in a significant increase in the proportion of life expectancy that is spent in this state of wellbeing and a significant decrease of the proportion spent in distress. So for females at the age of 16, there seems to be a compression of distress, both in an absolute sense (the number of life years) as well as in a relative sense (the proportion of life expectancy). For males at the age of 16, data did not reveal compression of distress, although the improvement in total life expectancy consists entirely of years in wellbeing.

At the age of 65, for both males and females, significant increases in years in wellbeing are found, while at the same time the number of years in distress has decreased significantly. For both males and females this decrease in years in a state of distress is caused both by a decrease in the number of years in serious distress and a decrease in the number of years in a state of mild distress. So at the age of 65 for males and females, we observed compression of distress both in an absolute sense as well as in a relative sense.

Although in 1998, females at the age of 16 have a total life expectancy that is 6 years higher than males, life expectancy in wellbeing is only 2 years higher. So two third of their surplus in life expectancy is in distress. This is reflected in the proportion of total life expectancy that is spent in wellbeing. For males this is almost 91%, for females it is about 86% (see Figure 2). In the broad sense, this result is well in line with other types of health expectancies where females almost always have a smaller proportion of their total life expectancy to be in a state of good health (Robine et al., 1998). A concept that is related to the life expectancy in wellbeing is the happy life expectancy (Kunst et al., 1994; Veenhoven, 1996). Kunst et al. calculated the happy life expectancy using data from a single item question in the Eurobarometer survey. In the Netherlands, happy life expectancy over the period 1984–1989 for males at age 15 is 53.9 years and for females at age 15 60.3 years. For males, this result is well in line with what is found in our study for the year 1989. For females however, life expectancy in wellbeing is lower compared to the happy life expectancy, calculated by Kunst et al. Veenhoven (1996) calculated the happy life expectancy for 48 countries, using data from the World Database of Happiness.

For the Netherlands, overall happy life expectancy at birth (males and females together) in 1990 is 61.7 years (about 80% of the total life expectancy). With this value, it is among the highest in the world. However, happy life expectancy is lower compared to the life expectancy in wellbeing (89% for males, 83% for females at age 16 in 1990). The differences can be due to methodological differences as well as to differences in the concepts.

In this article, we have used the negative part of the Bradburn Affect Balance Scale as a generic instrument to measure wellbeing. In its original version of the ABS, wellbeing was calculated as the balance between the score on the positive formulated items (positive affect) and the negative formulated items (negative affect). Since its publication in 1969 several modified versions of the Affect Balance Scale have been used. Although we would have preferred the use of the complete instrument, we could only use the five negative items, the format of the Affect Balance Scale that is included in the Netherlands Health Interview Survey. However, these five negative items correlate very well with other indicators of distress (anxiety, worry, stress) whereas the five positively formulated items have less relation with measures of wellbeing (Furer et al., 1995). The last decades, other instruments to measure wellbeing are developed and tested (Bowling, 1997). However, it is always a dilemma in national statistics to include new instruments or to stick to the old ones, having the opportunity to study changes over time. In the case of the Netherlands, the 5 negative items of the ABS are included since 1989, a unique feature in population health statistics. As the need for new instruments is acknowledged, starting in 2001 the Netherlands Health Interview Survey includes the Short Form 12-item version (SF-12) as a quality of life instrument, extended with three additional questions from the SF 36 on mental health problems (Ware, Jr. et al., 1997; Ware, Jr. et al., 1996). It might be possible to use one or more of these items as an alternative measure of wellbeing in the future.

A point for discussion in all articles presenting trends in health expectancies, is the use of the Sullivan's method as a basis for the calculation of trends. This specific issue is subject of many discussions in the Network on Health Expectancies (REVES) (Barendregt et al., 1994; van de Water et al., 1995). However, the article by

Mathers and Robine made it clear that Sullivans method is 'generally acceptable for monitoring relatively smooth long term trends in health expectancies for populations', conditions that are met in the situation studied here (Mathers and Robine, 1997).

The age and gender specific prevalence of wellbeing was estimated using data from the Netherlands Continuous Health Interview Survey. This survey does not include the institutionalised population, of which the most important groups are the elderly in residences for the aged and the population in nursing homes. In the Netherlands, no study is known on the wellbeing of these two groups of institutionalised persons. So we assumed the institutionalised population to have the same prevalence of wellbeing as the independent living population. However, if we assumed all the years lived in institutions to be years in distress – the case of the worst scenario –, for males this would subtract about 0.75 years of the life expectancy in a state of wellbeing. For females, this would result in a reduction of the number of years in a state of wellbeing of about 1.8 years.

However, results according the worst state scenario did not affect the trends. Until now, trends in health expectancies have mainly been assessed in terms of diseases, perceived health and disabilities (Robine et al., 1995; Perenboom et al., 2002). In this article the broader concept of wellbeing has been used. The increase in life expectancy in wellbeing as found in this study, does not run parallel with trends in life expectancy in good perceived health or to disability free life expectancy. Other studies reveal that both these types of health indicators show stagnating or decreasing trends for both males and females (Perenboom et al., 1997; Perenboom and Mulder, 2001). This means that wellbeing is not merely reflecting the – physical – health status, but other aspects of human life as well (for instance overall economic situation and general comfort (Bowling, 1997)). Supportive evidence can be found in a study of Hagerty and Veenhoven (2002). They conclude that growing economic wealth is related to increasing happiness. So, as a single indicator to monitor public health, wellbeing seems not to be a sufficient indicator to substitute for other concepts of health. On the other hand, we can conclude that over a period of ten years, these other aspects of human life have increased in influence so much that

they compensate for a decreasing life expectancy in good perceived health or without disabilities. Wellbeing should thus not be used as an umbrella concept of health, but as an additional concept of quality of life to the more conventional concepts of health: diseases, perceived health and disabilities.

REFERENCES

- Barendregt, J. J., L. Bonneux and P. J. van der Maas: 1994, Health expectancy: an indicator for change? *Journal of Epidemiology and Community Health* 48, pp. 482–487.
- Boshuizen, H. C. and H. P. A. van de Water: 1994, An international comparison of health expectancies (TNO Prevention and Health, Leiden).
- Bowling, A.: 1997, *Measuring health. A review of quality of life measurement scales* (Open University Press, Buckingham, Philadelphia).
- Bradburn, N. M.: 1969, *The structure of psychological well-being* (Aldine Publishing, Chicago).
- Bradburn, N. M. and D. Caplovitz: 1965, *Reports on happiness: a pilot study of behavior related to mental health* (Aldine Publishing, Chicago).
- Devins, G. M., M. Beiser, R. Dion, L. G. Pelletier and R. G. Edwards: 1997, 'Cross-cultural measurements of psychological well-being: the psychometric equivalence of Cantonese, Vietnamese, and Laotian translations of the Affect Balance Scale', *American Journal of Public Health* 87, pp. 794–799.
- Furer, J. W., C. König-Zahn and B. Tax: 1995, 'Affect Balance Scale (ABS)', in J. W. Furer, C. König-Zahn and B. Tax (eds.), *Beschrijving en Evaluatie van Vragenlijsten: 3: Psychische Gezondheid*. (Van Gorcum, Assen, pp. 42–54).
- Hagerty, M. R. and R. Veenhoven: 2002, 'Wealth and happiness revisited: growing wealth of nations does go with greater happiness', *Social Indicators Research* (accepted for publication).
- Heydendaal, P. H. J. M., J. W. Furer, P. P. G. Hodiament, P. G. M. Peer and E. J. H. ter Heine: 1986, 'De waarde van vijf screeningstests voor geestelijke (on)gezondheid', *Gezondheid and Samenleving* 7, pp. 138–144.
- Jagger, C.: 1997, *Health expectancy calculation by the Sullivan Method: a practical guide* (Euro-REVES/INED, Leicester/Paris).
- Kunst, A. E., P. T. Okma-Keulen and R. Veenhoven: 1994, Happy life expectancy in 5 European countries. Paper, presented at XIII World congress of Sociology, Bielefeld, Germany, July 18–23 (Erasmus University, Rotterdam).
- Mathers, C. D. and J.-M. Robine: 1997, 'How good is Sullivan's method for monitoring changes in population health expectancies', *Journal of Epidemiology and Community Health* 51, pp. 80–86.

- Perenboom, R. J. M. and Y. M. Mulder: 2001, Health expectancies of the elderly in the Netherlands. Paper, presented at the 13th meeting of REVES (TNO Prevention and Health, Leiden/Vancouver).
- Perenboom, R. J. M., L. M. van Hertem, H. C. Boshuizen and H. P. A. van de Water: 1997, 'Trends in de gezonde levensverwachting in Nederland 1983–1994, met een verdeling naar ernst van ongezondheid', in P. J. van der Maas and P. G. N. Kramers (eds.), *Volksgezondheid Toekomst Verkenning 1997; Deel III: Gezondheid en Levensverwachting Gewogen* (Elsevier/de Tijdstroom, Maarsse, pp. 53–77).
- Perenboom, R. J. M., H. van Oyen and M. Mutafova: 2002, 'Health expectancies in European countries', in J.-M. Robine, C. Jagger, C. D. Mathers, E. M. Crimmins, R. Suzman and REVES (eds.), *Determining Health Expectancies* (John Wiley & Sons, Ltd., Chichester).
- Robine, J.-M., I. Romieu, E. Cambois, H. P. A. van de Water, H. C. Boshuizen and C. Jagger: 1995, Global assessment in positive health: contribution of the Network on Health Expectancy and the Disability Process to World Health Report 1995 (WHR95) by World Health Organization (WHO) (INSERM/TNO-PG/Univ. of Leicester, Montpellier/Leiden/Leicester).
- Robine, J.-M., I. Romieu and M. Jee: 1998, Health Expectancy in OECD countries (INSERM/REVES, Montpellier).
- Statistics Netherlands: 1996, Netherlands Health Interview Survey 1981–1995 (Sdu-publishers/CBS-publications, Den Haag/Voorburg/Heerlen).
- Sullivan, D. F.: 1971a, 'A single index of mortality and morbidity', *HSMHA Health Reports* 86, pp. 347–354.
- Sullivan, D. F.: 1971b, Disability components for an index of health – a methodological study of an aggregative measure of several forms of disability intended for use as one component of a joint mortality-morbidity index (National Center for Health Statistics, Rockville) (US Department of Health, Education, and Welfare – Public Health Service).
- van de Water, H. P. A., H. C. Boshuizen, R. J. M. Perenboom, C. D. Mathers and J.-M. Robine: 1995, 'Health expectancy: an indicator for change? Letter to the editor', *Journal of Epidemiology and Community Health* 49, pp. 330–331.
- Veenhoven, R.: 1996, 'Happy life expectancy. A comprehensive measure of the quality of life in nations', *Social Indicators Research* 39, pp. 1–58.
- Ware, J. E., Jr., M. Kosinski and S. D. Keller: 1996, 'A 12-item Short-form health survey: construction of scales and preliminary test of reliability and validity', *Medical Care* 34, pp. 220–226.
- Ware, J. E., Jr., K. K. Snow, M. Kosinski and B. Gandek: 1997, *SF-36 Health Survey: Manual and interpretation guide* (The Health Institute, New England Medical Center, Boston).
- Wilkins, R., J. Chen and E. Ng: 1994, 'Changes in health expectancy in Canada from 1986–1991', in C. D. Mathers, J. McCallum and J.-M. Robine (eds.), *Advances in Health Expectancies* (Australian Institute of Health and Welfare, AGPS, Canberra, Australia, pp. 115–132).

*TNO Prevention and Health
Division Public Health
Leiden
The Netherlands*

R.J.M. Perenboom

*(Author for correspondence:
TNO Prevention and Health
Division Public Health
P.O. Box 2215
2301 CE Leiden
The Netherlands
Fax: + 31 71 518 1903
E-mail: rjm.perenboom@pg.tno.nl)*

*TNO Prevention and Health
Division Public Health
Leiden
The Netherlands*

Loes M. van Herten

*National Institute of Public Health
and the Environment
Division of Public Health Research
Bilthoven
The Netherlands*

H.C. Boshuizen

*Academic Medical Centre
Department of Social Medicine
Amsterdam
The Netherlands*

G.A.M. van den Bos

*National Institute of Public Health
and the Environment
Department for Health Services Research
Bilthoven
The Netherlands*