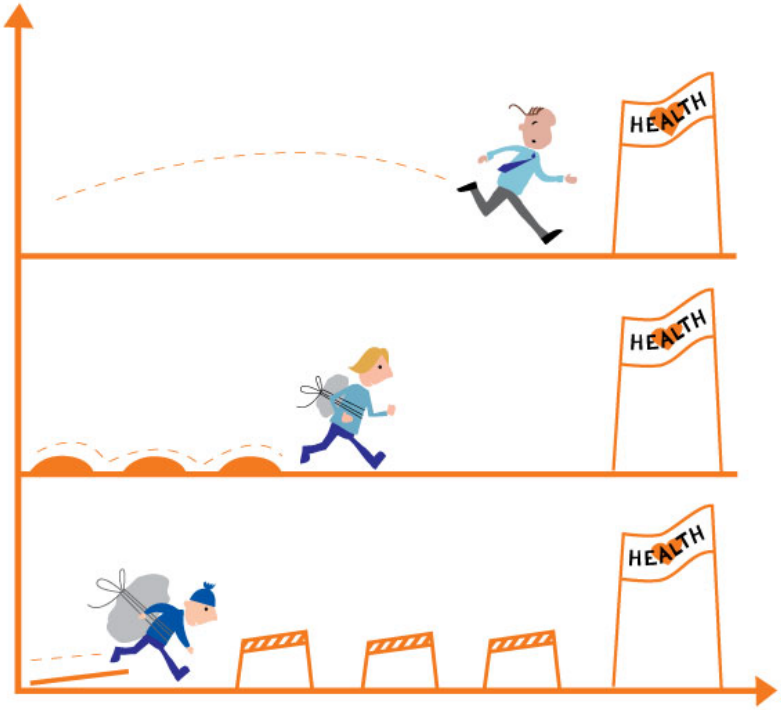
The poor breast cancer patient
- social inequality in outcomes after breast cancer

Susanne Dalton
Senior Researcher, MD, PhD
Survivorship
Danish Cancer Society Research Center



This talk

- Social inequality in health
- Social position and cancer
- Factors mediating social inequality in breast cancer survival
- Is the inequality in breast cancer survival changing with time?
- Inequality in breast cancer rehabilitation and survivorship?

Introduction to socioeconomic position (SEP)

- Summary term for socio-economic factors, like education, income, occupation
- Can be measured on the individual level or area-based
- Each marker not just exchangeable indicators of same underlying concept but rather acknowledging causal chain:

  Education -> Occupation -> Income -> housing

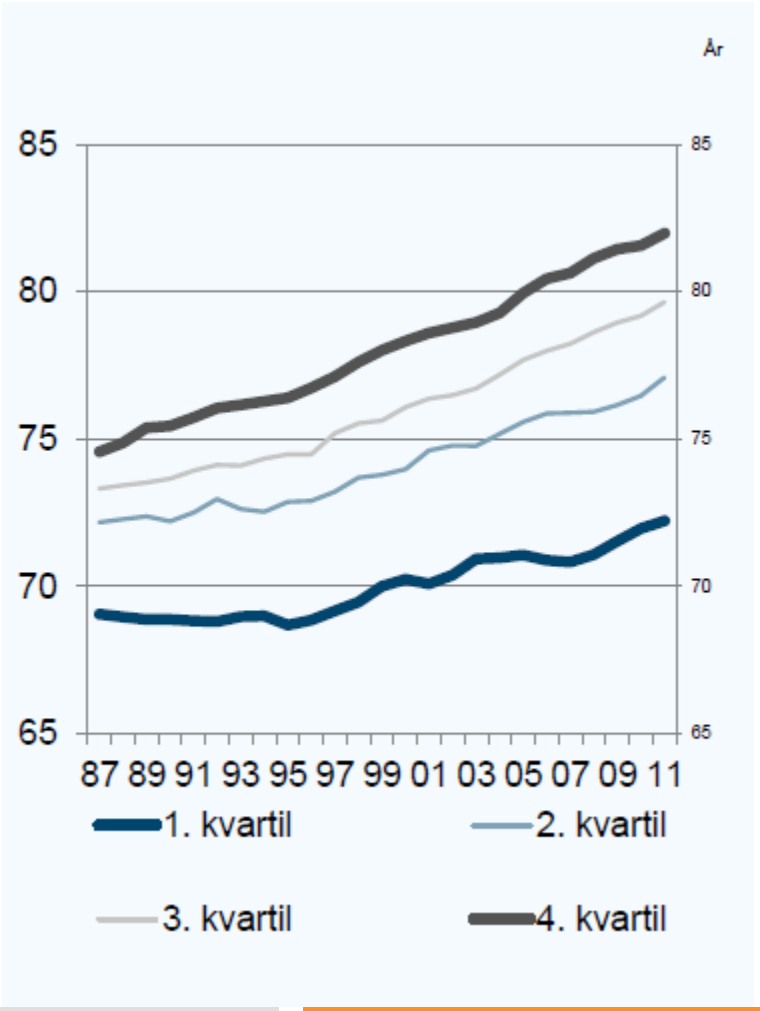
- Different from i.e British tradition of Social Class measures that combine several aspects in one summary measure
- Not a risk factor per se but rather an indicator for life style and life circumstances

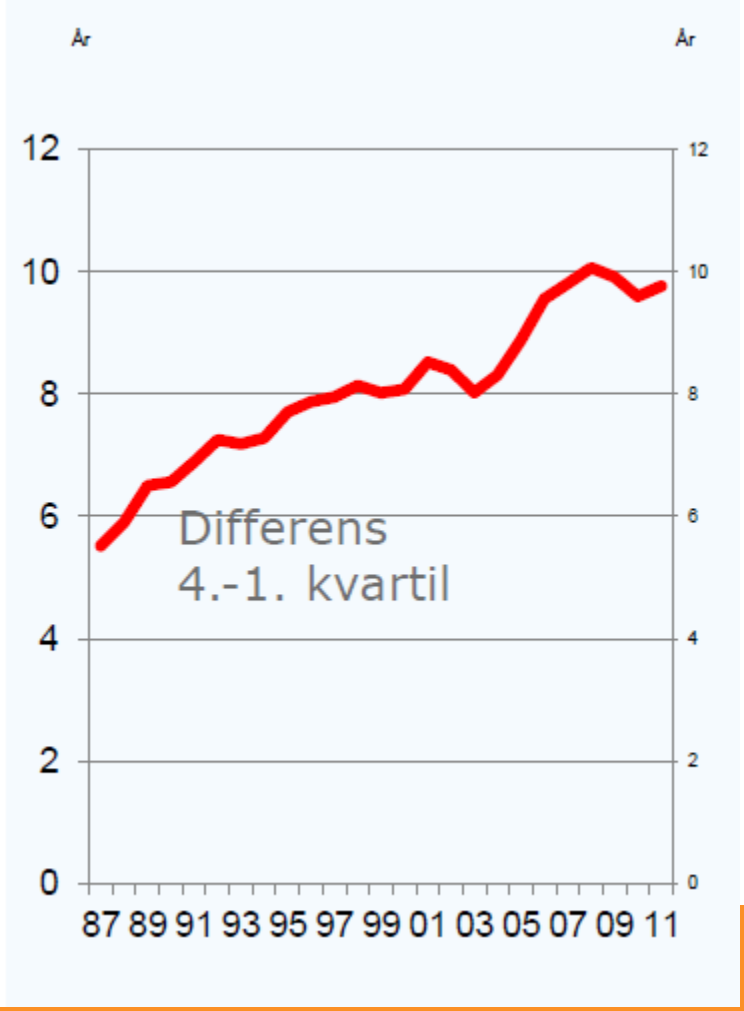
Social inequality in health – the gap versus gradient

Social gradient in disease burden – where disease burden reduces across the full scale with increasing education or income

The gap – a heavy disease burden for marginalised groups – disease is both a cause of and result of marginalization (poverty, social exclusion etc)

Inequality by education in lifespan among Danish men – doubled from 1987 to 2011





The stage is set

- Over the past 40 years – increasing social differences in life expectancy – parallel to what is observed in other Western countries
- A welfare state with universal benefits and a relatively flat income distribution has not guaranteed lower social inequality in health
- The development of an easy access and efficient health system has not stopped this development

This talk

- Social position and cancer
- Factors mediating social inequality in breast cancer survival
- Is the inequality in breast cancer survival changing with time?
- Inequality in breast cancer rehabilitation and survivorship?

CANULI Study (CANcer og ULIghed) – a national study in Denmark

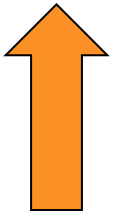
A study of social position and incidence of and survival after cancer

Total of 4 mill. Danes born 1920-1980

Incidence 1994-2003
Survival up to 2006

Registry linkages between administrative registries

Low social position and cancer incidence



Head&Neck

Esophagus

Stomach

Lung

Cervix

Kidney

Bladder

Pancreas

Colon

Rectum

Endometrium

Ovary

Testicle

Brain

Lymphoma

Leukemia

Breast

Prostate

Melanoma

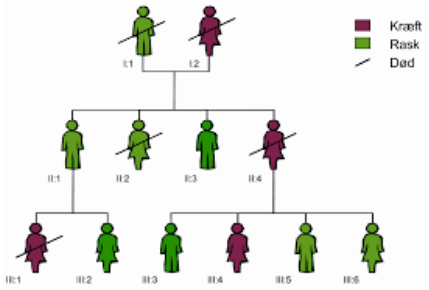
Dalton et al, 2008

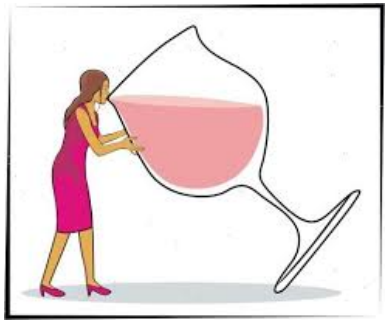
Why social inequality in incidence of cancer?

Risk factors are differentially distributed between social groups i.e.

- Health behaviour (smoking, alcohol, exercise, diet, sexual habits, screening)
- Work environment (occupational carcinogens)
- Local environment (air pollution etc.)

In the case of breast cancer….

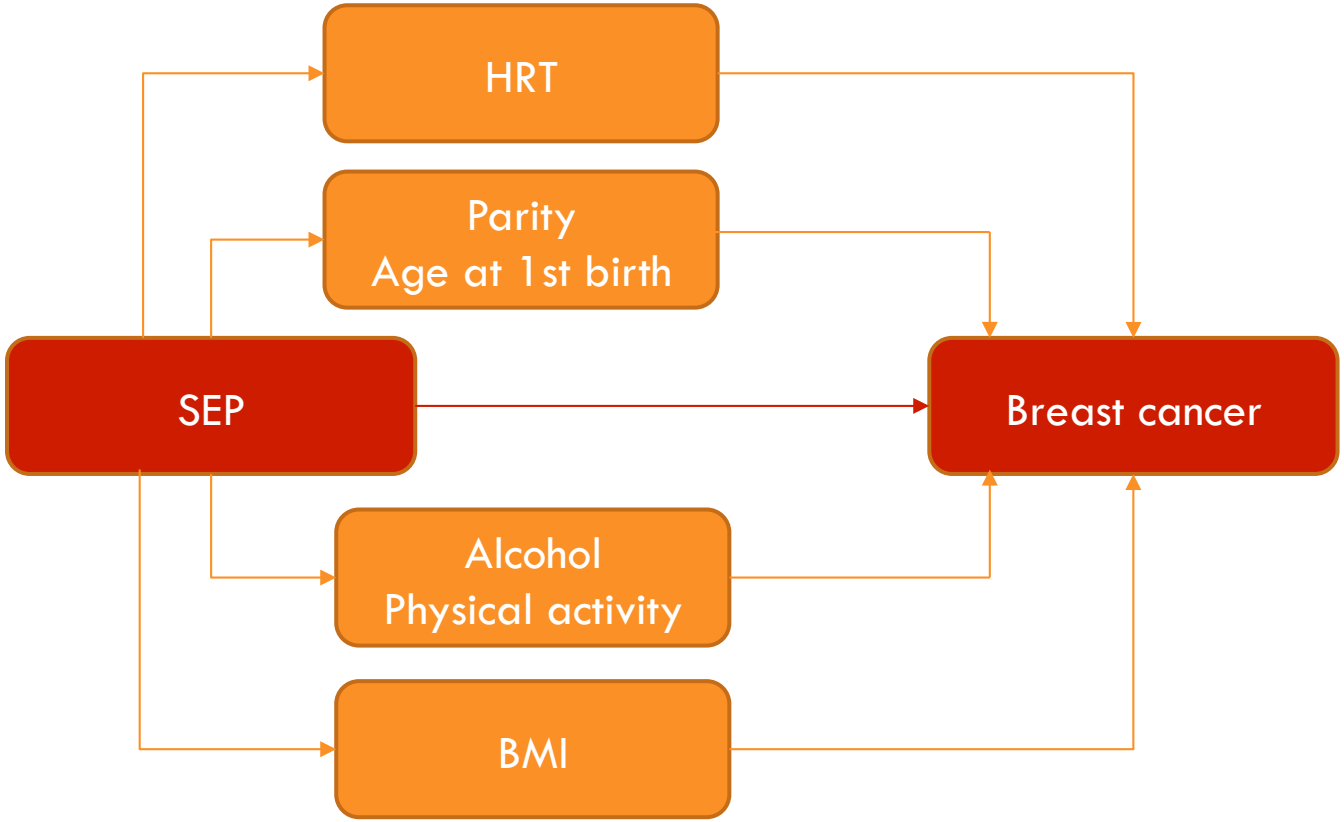




Sex / Race / Age / Early menarche / Late menopause / No or few births / Alcohol
Smoking in young age / Obesity / Night work / Oral antikonception / Hormone Replacement Treatment
Familial disposition / Previous breast cancer / Benign breast conditions / Radiation to the breast

Breast cancer: Incidence **Etiologi** Stage at diagnosis

Direct and indirect pathways from SEP to breast cancer



Mediators of social inequality in post-menopausal breast cancer diagnosed among 23,111 women in Diet, Cancer and Health (Larsen et al, 2011)

	HR	Adjusted HR
Short education	1.00	1.00
Medium education	1.03	0.97
Higher education	1.20*	1.06
Self-employed	1.46*	1.36
Higher official	1.38*	1.23
Lower official	1.38*	1.25*
Skilled	1.56	1.42
Unskilled	1.00	1.00

*Adjusted for potential mediators: HRT use, parity, age at 1st birth, alcohol intake, BMI

Mediators of social inequality in post-menopausal breast cancer in Danish women

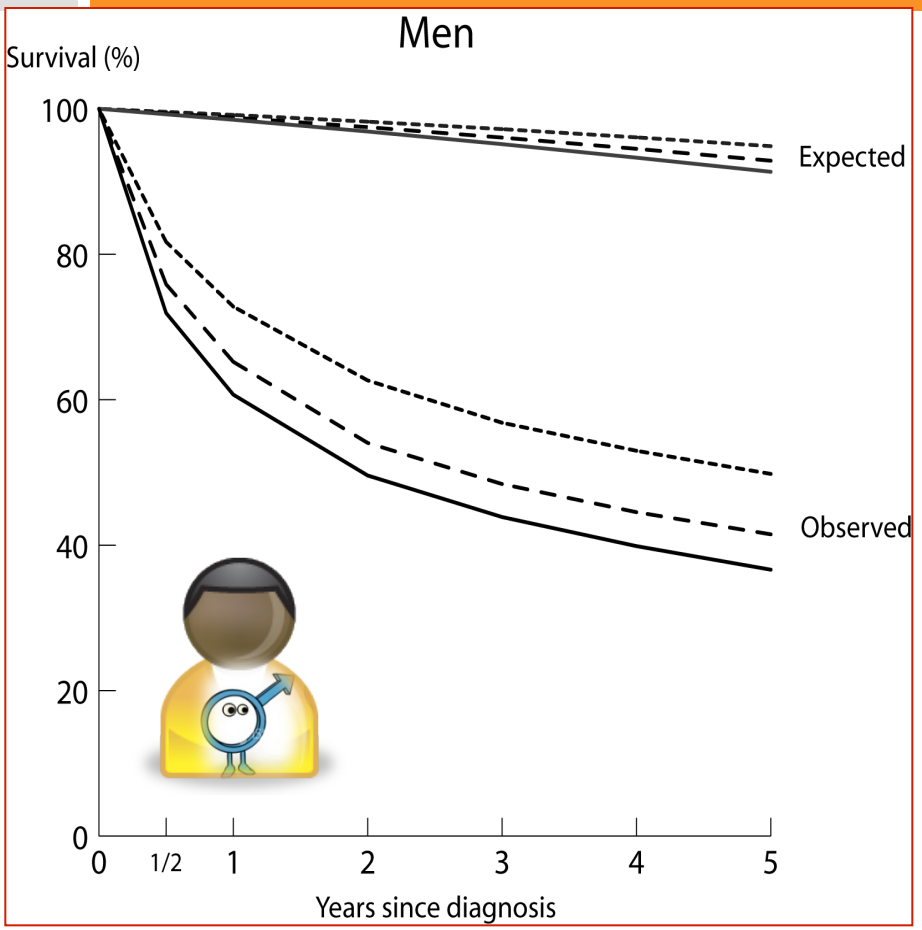
In a combined cohort of 33,562 women from Diet, Cancer and Health, Copenhagen City Heart Study, and cohorts from the Research Centre for Population and Health

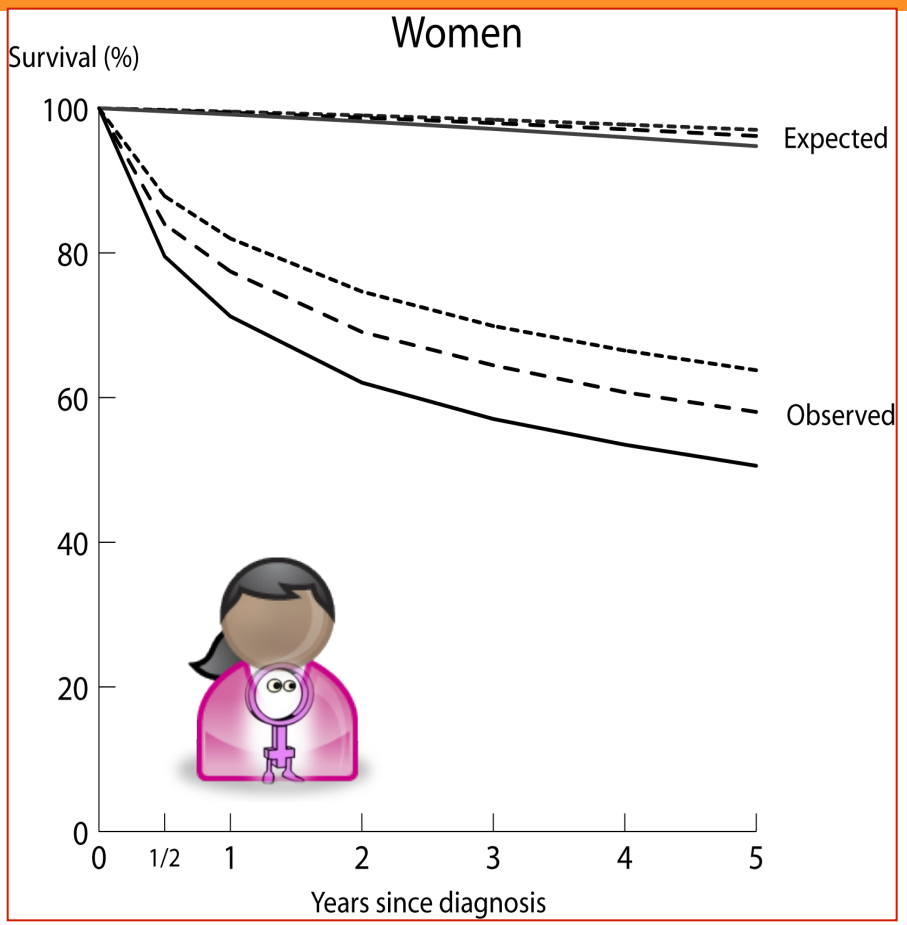
Mediated proportion of inequality in BC incidence (comparing high education to low):

Alcohol consumption	26%
Parity	19%
Age at 1st birth	32%
HRT use	10%

Hvidtfeldt et al, 2013

Social inequality in survival after cancer measured as relative survival -> Difference between observed and expected survival



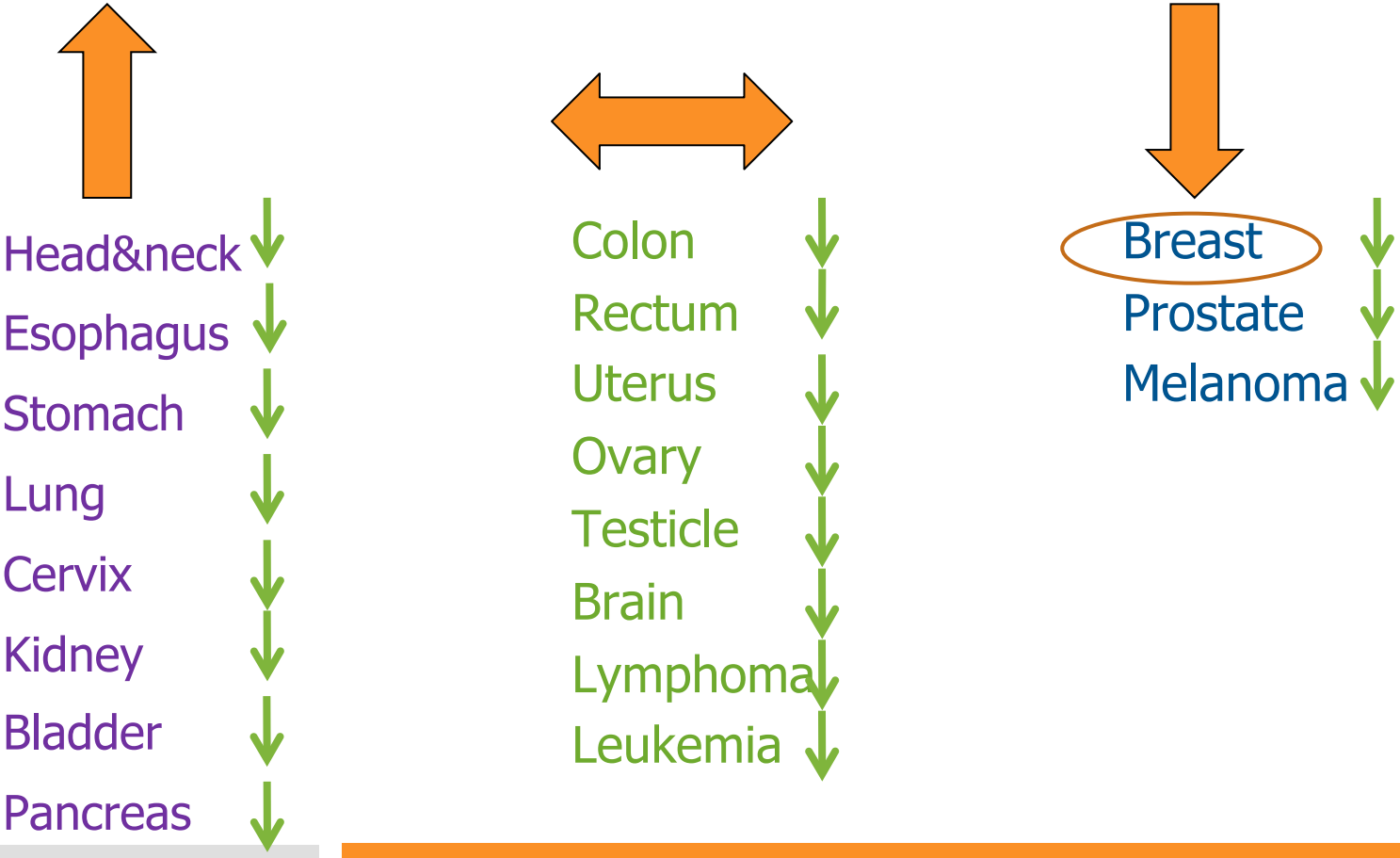


Education: — Basic School - - - Vocational ----- Higher

Low social position and 5-year relative survival

Site	Education Basic/Higher		Disposible income Low/High		
Mouth&pharynx (↑)	30/39	44/47	25/46*	42/43	↓
Lung (↑)	7/10*	9/10	7/8*	9/10	↓
Cervix (↑)		68/78*		68/73	↓
Colon (→)	42/46	46/49	40/46*	45/55*	↓
Brain (→)	39/47*	58/66*	42/43	58/65	↓
Leukemia (→)	46/54	46/52	45/56*	49/57	↓
Breast (↓)		77/84*		75/83*	↓
Prostate (↓)	47/59*		47/56*		↓
Melanoma (↓)	75/81*	86/92*	73/82*	87/92*	↓

Low social position and survival after cancer



Dalton et al, 2008

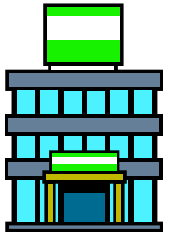
This talk

- Factors mediating social inequality in breast cancer survival
- Is the inequality in breast cancer survival changing with time
- Inequality in breast cancer rehabilitation and survivorship?

Using the DBCG to investigate factors explaining social inequality in cancer outcomes

31,770 women diagnosed with breast cancer in Denmark, 1983-99

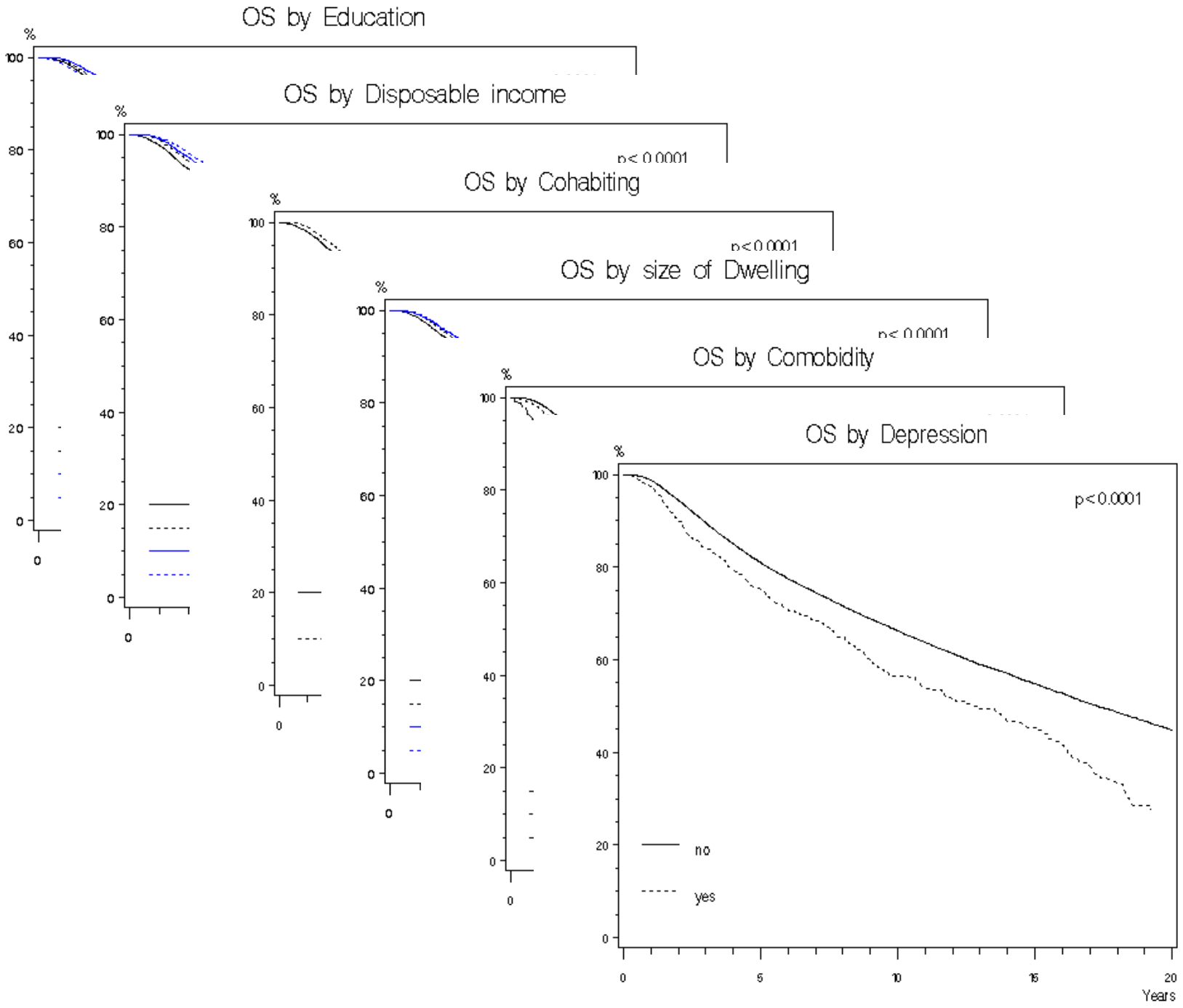
Socioeconomic data



Prognostics and treatment from DBCG

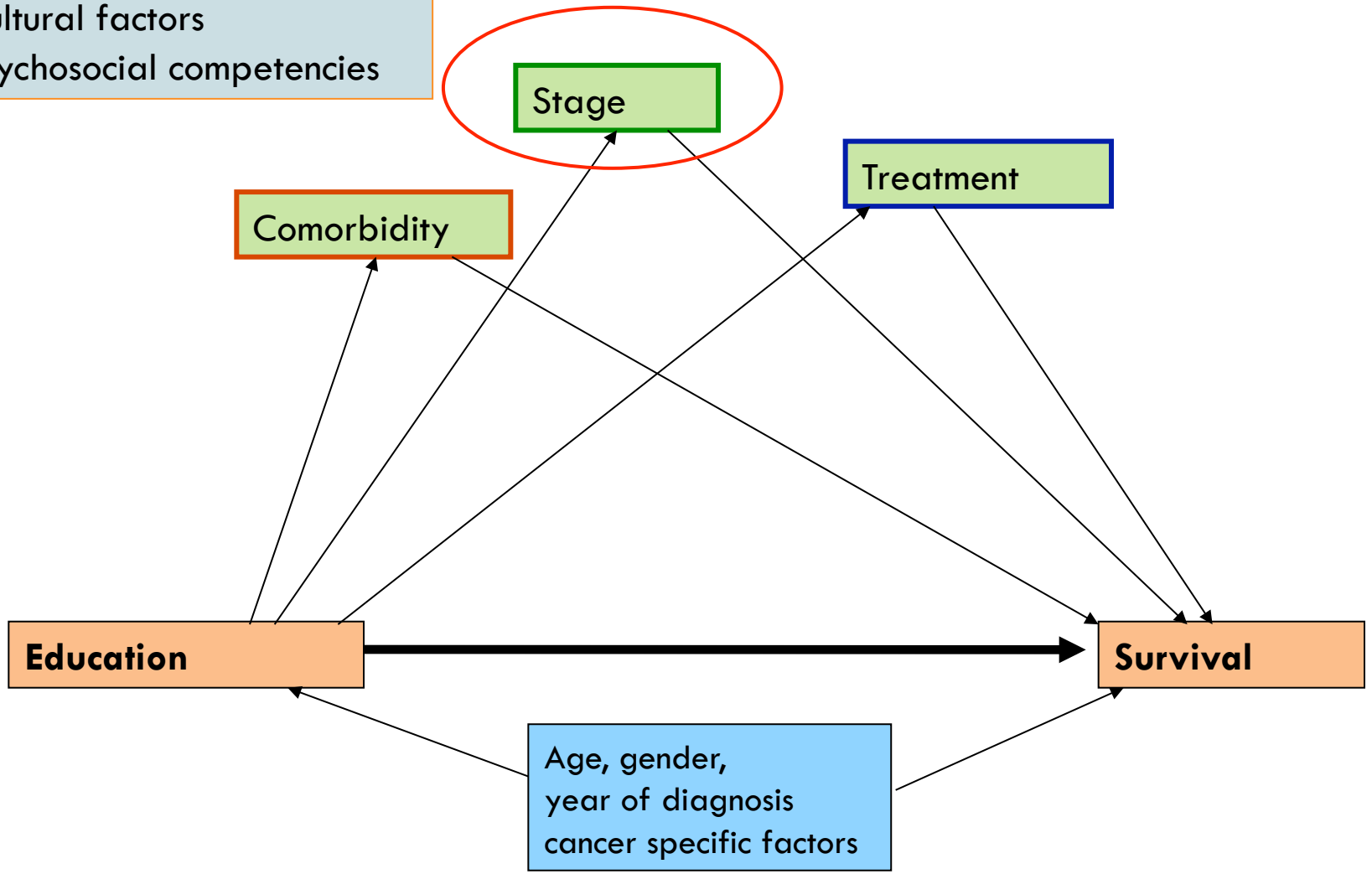
CPR-nummer

Cancer, comorbidity, vital status


OS by Education
OS by Disposable income
p< 0.0001
OS by Cohabiting
p< 0.0001
OS by size of Dwelling
p< 0.0001
OS by Comobidity
OS by Depression
p< 0.0001
%
100
80
60
40
20
0
0
5
10
15
20
Years
no
yes

Social inequality in survival after cancer

System related factors
Staff qualifications
Access
Cultural factors
Psychosocial competencies



Social inequality in stage at diagnosis

In 28,765 women with breast cancer, some 20% were categorized as low risk:

Risk for a diagnosis with high-risk breast cancer increased with

- shorter education (OR 1.14)
- lower disposable income (OR 1.22)
- living in rural areas (OR 1.10)
- no access to mammography screening (OR 1.75)

Dalton et al, 2006

What role does biology play in this?

We separated the analysis by menopausal status: 11,685 premenopausal and 17,080 postmenopausal

Apart from access to screening these effects of social inequality were significant only for postmenopausal women

- Suggesting that a subgroup of aggressive premenopausal cancers are less influenced by socioeconomic position

Why should there be social inequality in stage at breast cancer diagnosis?

Social differences in:

- Knowledge about symptoms and disease
- Health behaviour
- Screening participation
- Communication with health personel
- Ability to ”push your way through” in health system?

- Biology – tumour aggresiveness; hormone sensitivity

… how do these findings compare to other cancers?

Patients with short education or who live alone are at higher risk of advanced disease at diagnosis:

Rectum cancer (Frederiksen et al 2008)

Lung cancer (Dalton et al 2011)

NHL (Frederiksen et al 2011)

Cervix cancer (Ibfelt et al 2012)

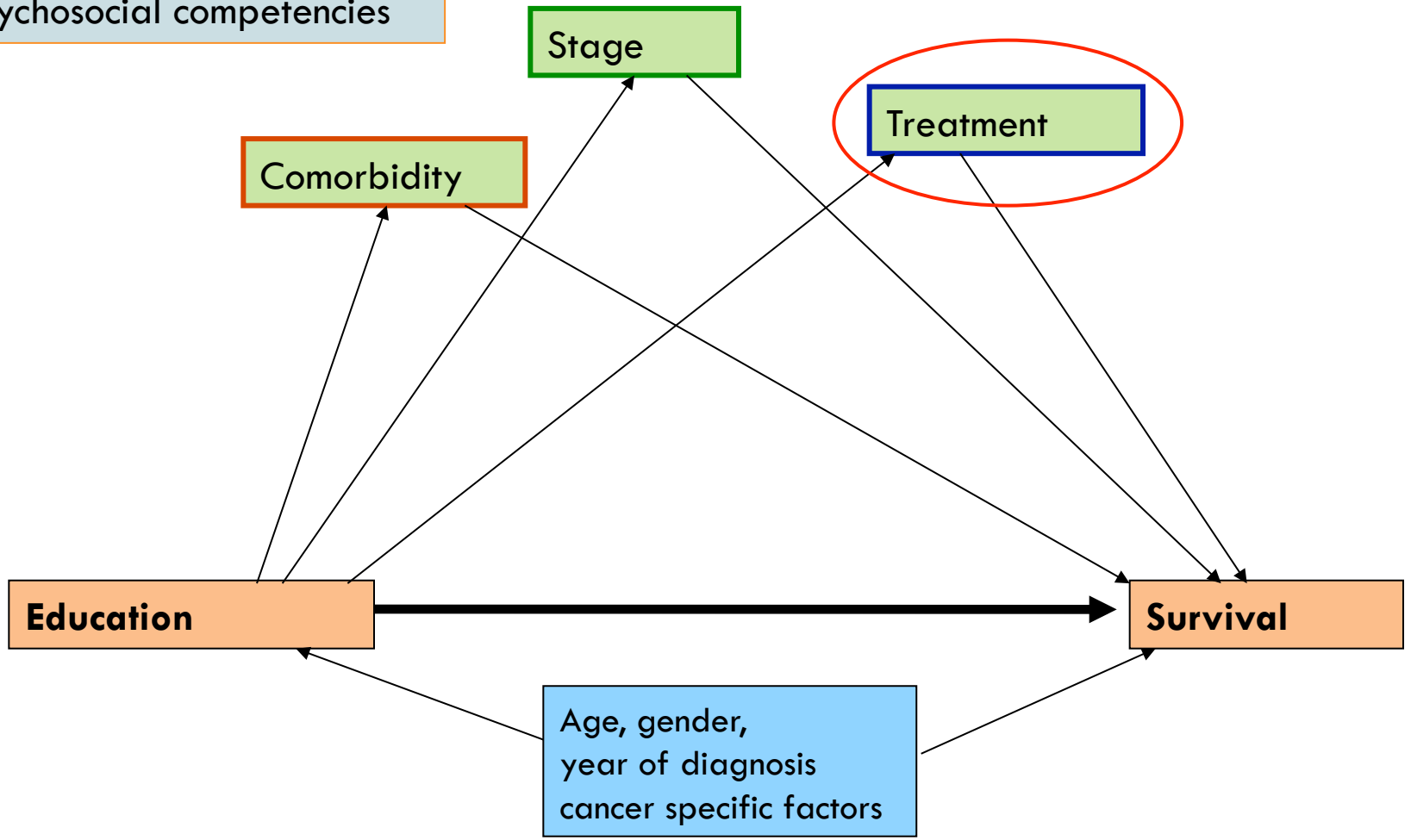
Head & Neck cancer (Olsen et al, 2015)

Endometrium cancer(Seidelin et al, 2015)

But not colon cancer (Frederiksen et al 2008) or ovary cancer (Ibfelt et al, 2015) – characterised by unspecific symptoms

Social inequality in survival after cancer

System related factors
Staff qualifications
Access
Cultural factors
Psychosocial competencies



Why should there be social differences in received treatment for cancer?

Social differences in:

- health literacy
- communication with health personel
- ability to negotiate and question
- fatalism/preconceptions of treatment effect

- comorbidity and general health status

… and are there social differences in received treatment for breast cancer?

We found no indication of social difference in receipt of surgery, chemotherapy or radiation

(Dalton et al, 2007)

But what about endocrine treatment – long term treatment with possible side effects
-> adherence may be differential by social group?

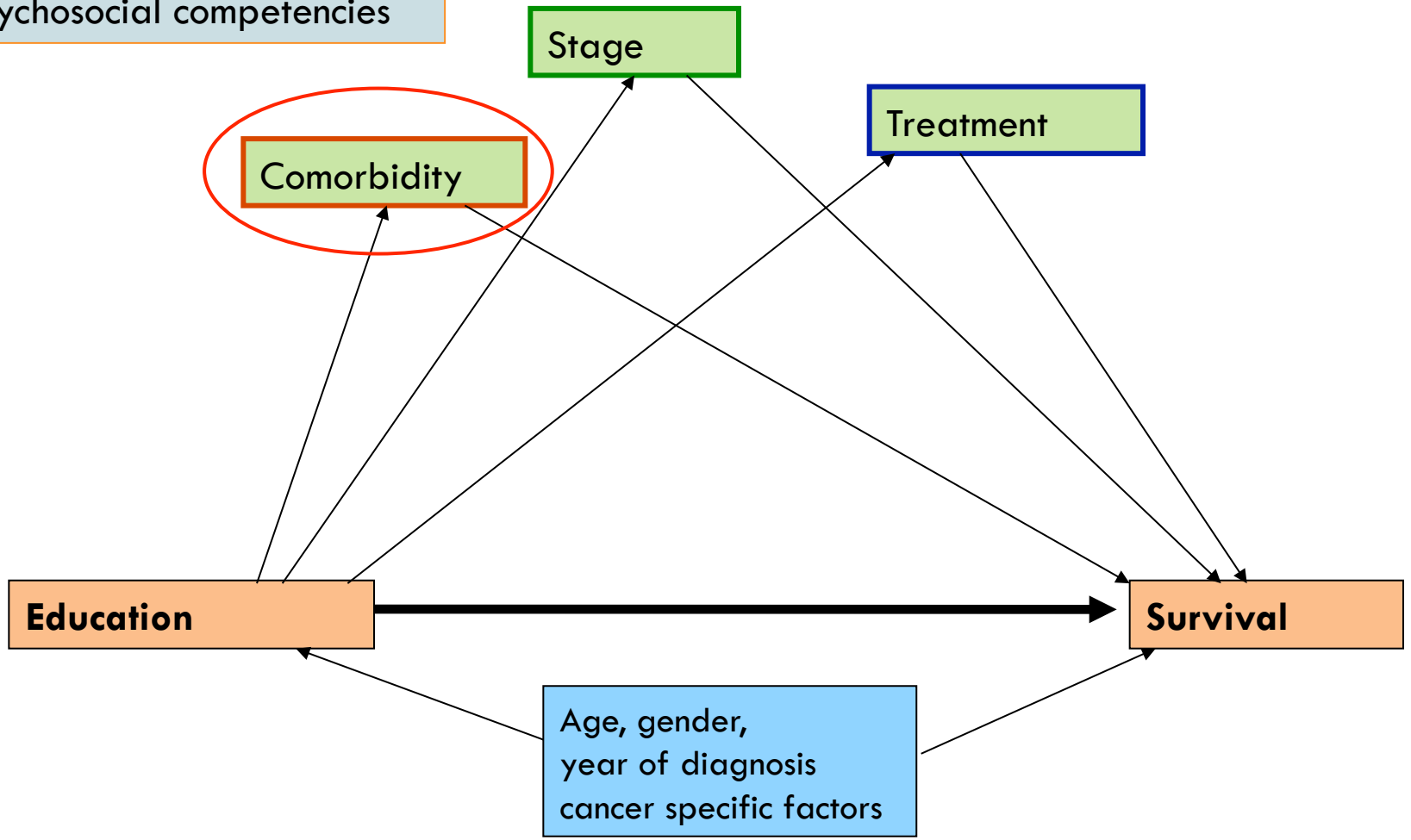
… and are there social differences in received treatment for breast cancer?

Among women diagnosed 1998-2006 with ER positive BC and followed to 2010 we found no increased HR among those receiving ET – and lower than those who did not

…if mortality can be used as a proxy for adherence with treatment – then there seem to be no inequality in adherence to ET (Kamstrup-Larsen, unpublished)

Social inequality in survival after cancer

System related factors
Staff qualifications
Access
Cultural factors
Psychosocial competencies



Comorbidity associated with reduced survival after cancer

- Higher mortality of comorbid diseases
- Suboptimal treatment (i.e. Janssen-Heijnen et al, 2005; Koppie et al, 2008; Land et al, 2012)
- Increased toxicity of treatment -> lower compliance (...or increased mortality per se)
- Strong social inequality in comorbidity among cancer patients

Comorbidity in cancer patients – reflect age profiles and shared risk factors

Comorbidity and survival – the example of breast cancer

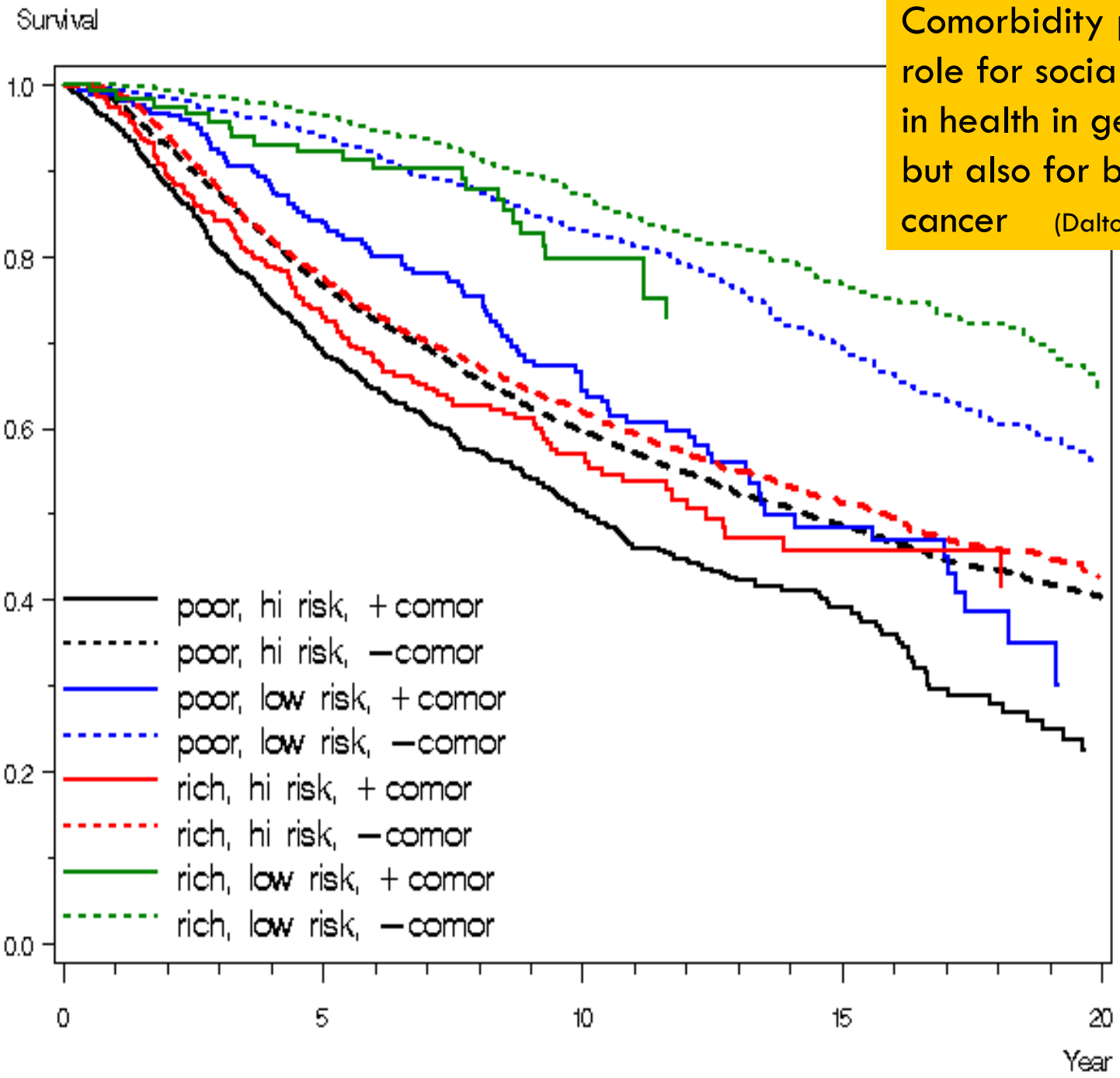
5-years survival among 47,695 women with breast cancer diagnosed 1990-2004

	CCI 0	CCI 1	CCI 2	CCI 3+
1990-4	72.5 (71.7-73.3)	56.8 (52.8-58.6)	53.0 (48.9-56.8)	42.0 (35.8-48.1)
1995-99	77.3 (76.6-78.1)	61.5 (58.9-63.9)	56.9 (53.5-60.3)	44.7 (39.9-49.5)
2000-4	81.6 (80.9-82.2)	68.0 (65.9-69.9)	62.6 (59.8-65.3)	43.5 (39.8-47.0)

- Survival has increased considerably among women through this period – no increase in women with severe comorbidty (CCI3+)

Land et al, 2012

Comorbidity plays a a role for social inequality in health in general – but also for breast cancer (Dalton, 2007)



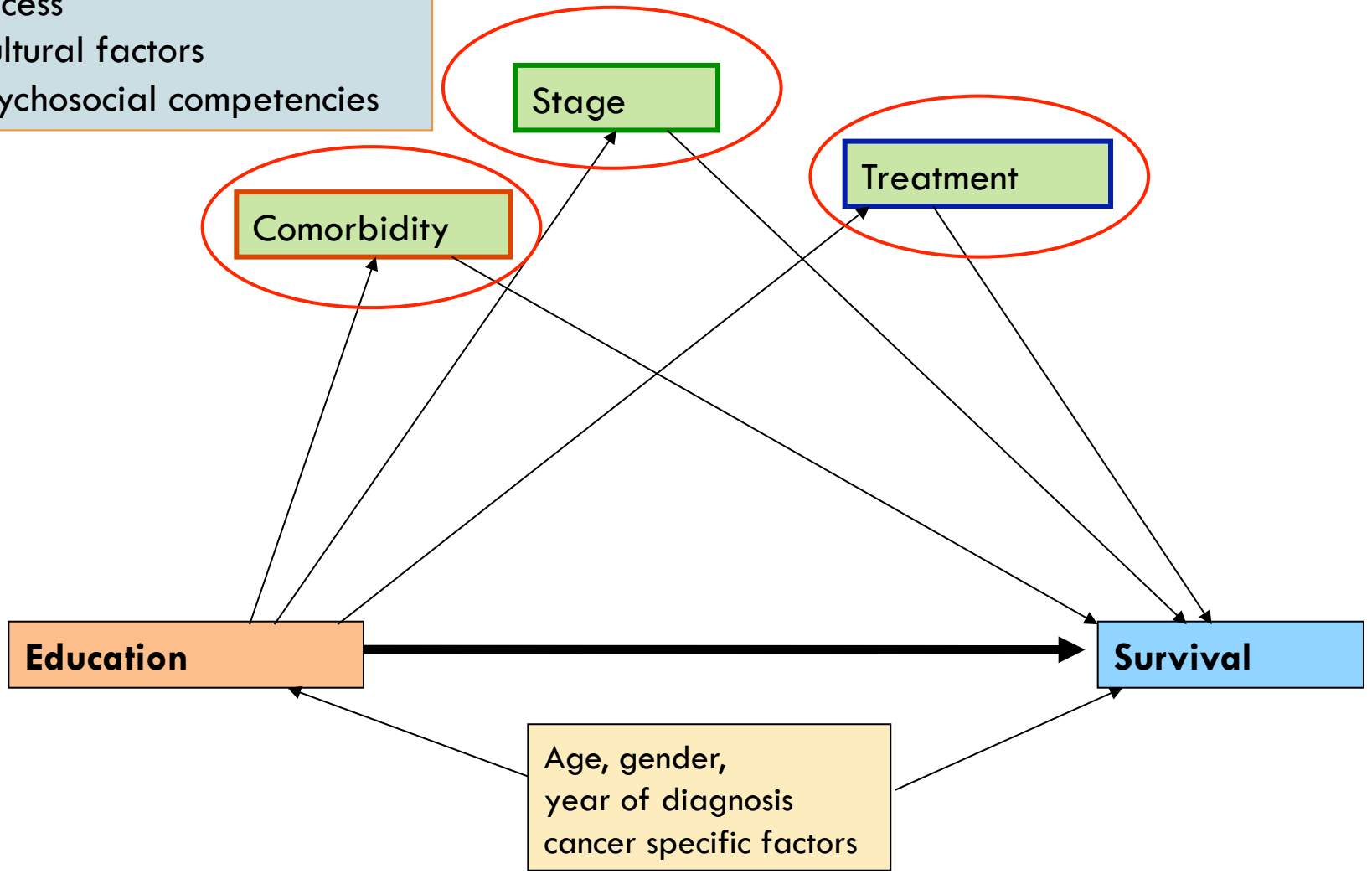
Comorbidity means more for prognosis among poorest than richest women (Dalton et al, 2007)

In absolute terms the difference in survival is largest among women with low risk breast cancer:
Low risk breast cancer + comorbidity:

Lowest income (0-25%)	10-års survival is 65%
Highest income (75-100%)	10-års survival is 80%

Do stage, treatment and comorbidity mediate social differences in cancer survival?

System related factors
Staff qualifications
Access
Cultural factors
Psychosocial competencies



Social inequality in survival after breast cancer among women diagnosed 1983-1999 and allocated to protocol treatment

Multivariate adjusted analyses – taking into account clinical prognostic factors, age, comorbidity and SEP

	Death all causes	
	HR	(95% CI)
Higher education	0.91	(0.85-0.98)
High income (Q4)	0.89	(0.83-0.95)
Living w partner	0.95	(0.91-1.00)
CCI 2+	2.19	(1.94-2.47)
Depression	1.19	(1.21-1.70)

More of the women not allocated to protocol treatment had low income or lived alone.

Dalton et al, 2007

…Social inequality greater in death due to other causes than breast cancer

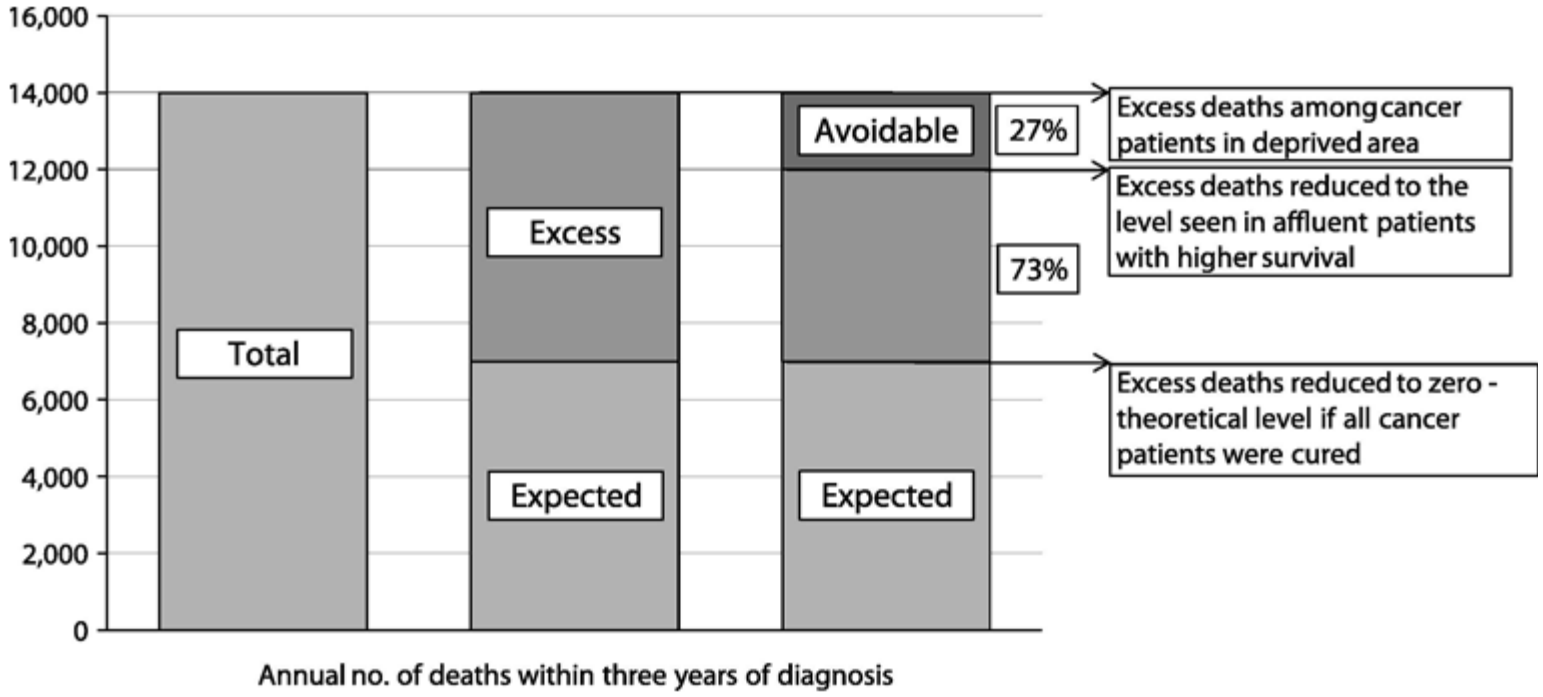
	BC deaths		BC specific deaths	
	HR	(95% CI)	HR	(95% CI)
Higher education	0.93	(0.85-1.01)	0.80	(0.66-0.96)
High income (Q4)	0.92	(0.84-1.00)	0.79	(0.66-0.93)
Living w partner	1.00	(0.94-1.07)	0.83	(0.75-0.92)
CCI 2+	1.52	(1.25-1.85)	5.77	(4.77-6.97)
Depression	1.12	(0.96-1.31)	1.30	(1.04-1.63)

- The social inequality in survival after breast cancer is partly mediated by social differences in stage and comorbidity, but not treatment
- Striking differences in 10-year survival among the patients with highest and lowest income
- …. No matter the reasons, life is shorter among poor women treated for breast cancer in Denmark

This talk

- Is the inequality in breast cancer survival changing with time
- Inequality in breast cancer rehabilitation & survivorship

Social inequality in survival after cancer – how much can be gained in terms of postponed deaths



Partition of the annual number of deaths in cancer patients within three years since diagnosis into the number expected from background mortality and the number of excess deaths (attributable to cancer). This hypothetical example shows the proportion of all excess deaths that would be avoidable (27%) if relative survival in all deprivation categories were as high as in the most affluent patients.

European Journal of Cancer
Volume 48, Issue 2, January 2012, Pages 270-278

doi:10.1016/j.ejca.2011.10.008 | How to Cite or Link Using DOI

This talk

- Inequality in breast cancer rehabilitation & survivorship?

Patients with high education are more likely to have immediate or delayed breast reconstruction than patients with short education

	OR	95% CI
Immediate reconstruction		
Short education	1	Ref
Medium education	2.01	1.13-3.56
Higher education	2.10	1.14-3.86
Delayed reconstruction		
Short education	1	Ref
Medium education	1.52	1.23-1.86
Higher education	1.41	1.12-1.77

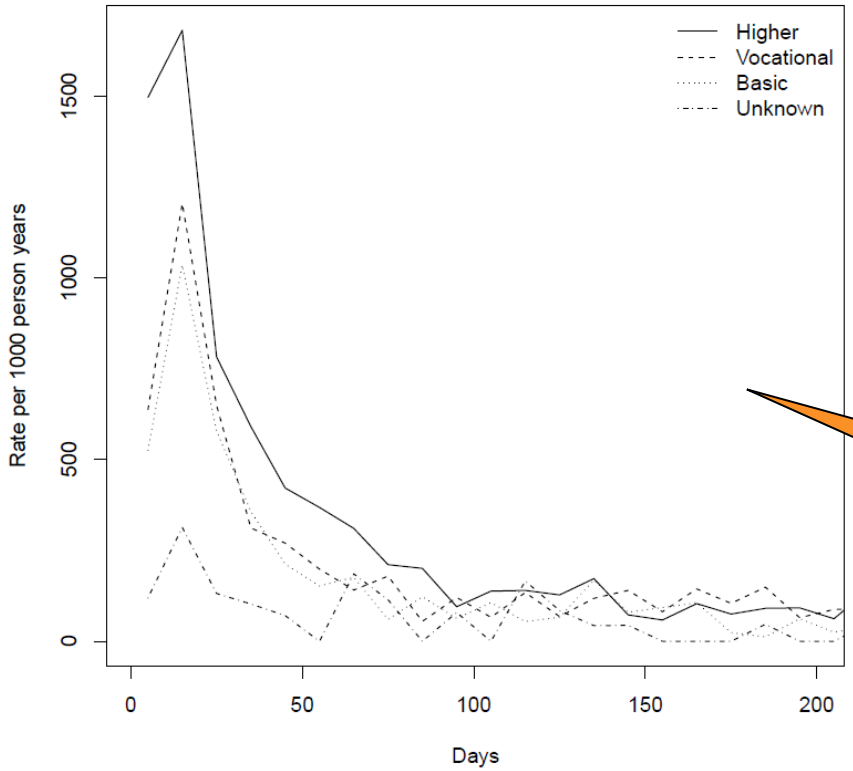
Analyses separated by age showed that this social inequality was only present among women who were aged 45 or more – for both immediate and delayed reconstruction

(Hvilsom et al, 2011)

Social inequality in cancer rehabilitation?

- Up to 70 % of all cancer patients have a need for rehabilitaiton (Tvede et al 2003)
- Short education and low income – patients partipate less in rehabilitation and have more unmet needs (Holm et al 2013)
- Social inequality observed in risk for depression after breast cancer (Suppli et al 2015)
- Reverse social inequality observed in use of hypnotics in the first year after breast cancer – but low education was associated with chronic use (Andersen et al, 2015)

Rate of referral to rehabilitation by education (Moustsen et al, 2015)



13,840 cancer patients in Copenhagen Municipality, 2007-2012

Higher referral rate with higher education (HR 1.33)

- Knowledge about available rehabilitation services
- Ability to express needs for rehabiliation
- Communication barriers
- Relevant services

Return to work – a measure of rehabilitation

Among 14,750 women diagnosed with BC 2001-9, risk factors for unemployment 2 years after diagnosis included:

- Being unemployed prior to BC
- Low income
- Short education
- Age

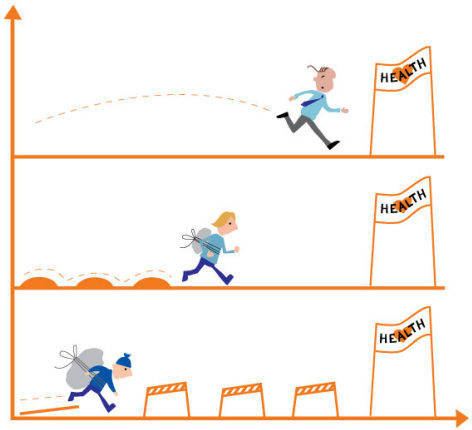
But not adjuvant treatment (Carlsen et al, 2014)

"It is not over when it is over"

Among women who had survived 5 years after BC and returned to work, 39% reported impaired work ability compared to 29% of age-matched controls.

Impaired work ability was associated with
Low income
Fatigue
Little help and support from supervisor (Carlsen et al, 2013)

Is it at all possible to make a difference on this observed social inequality in breast cancer outcomes….?



Examples on interventions addressing social inequality in health

Patient navigation:
Promising results for both diagnostic process and for time to start of treatment for cancer.

Effect of both nurse led and volunteer led navigation

Especially effect in connection with care transitions (between sectors/departments/treatments) (i.e. Freund 2014; Ko 2014)

Social inequality in breast cancer

1. Social differences in who gets breast cancer –may be changing over time

2. Social differences in survival are modest but persistent with time:
   a) stage at diagnosis
   b) no/minor differences in adequate treatment
   c) comorbidity (and health behavior?)

3. Social differences in consequences of cancer?
   a) return to work
   b) Referral to rehabilitation services

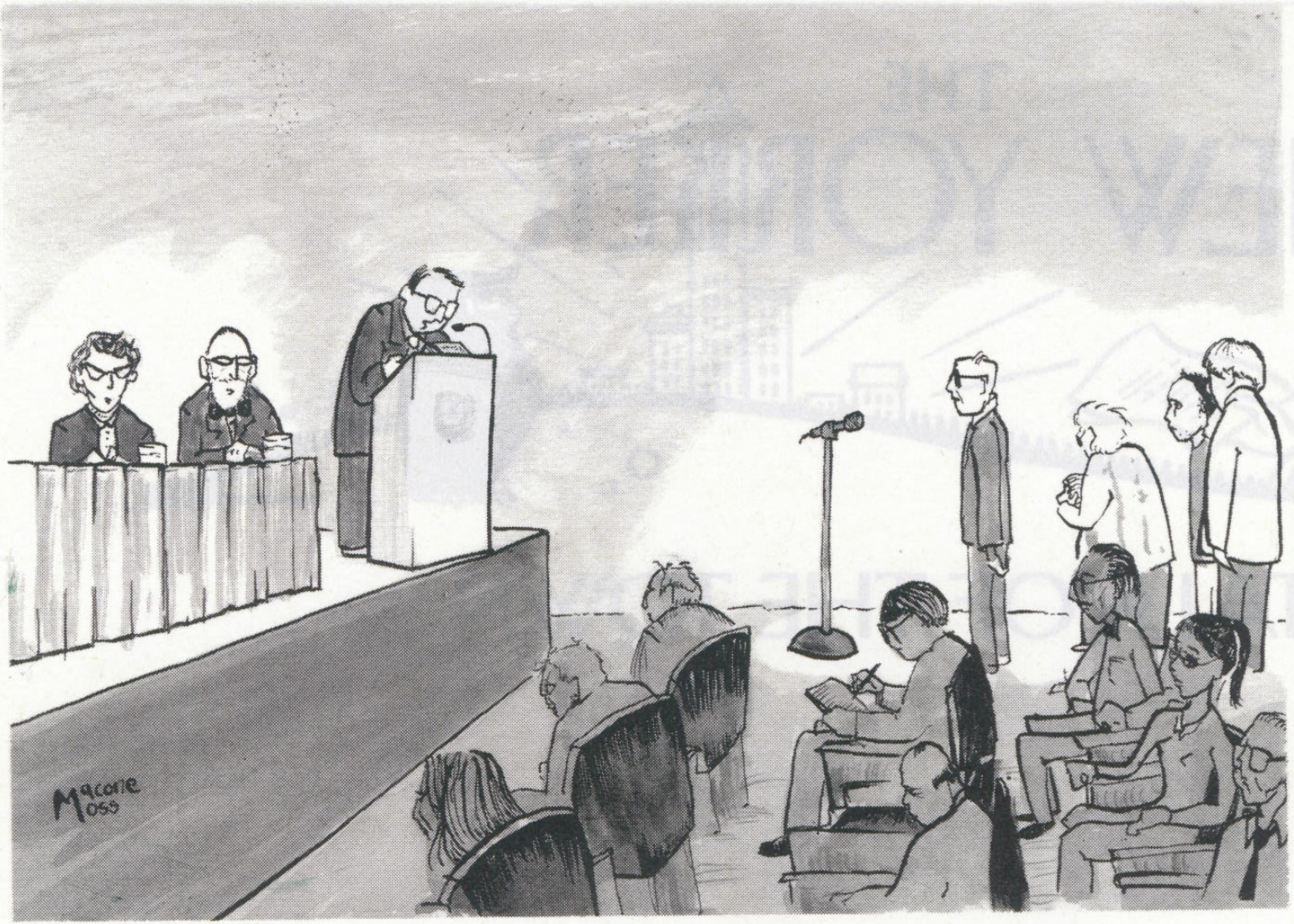
Social inequality in cancer is NOT to a large degree introduced by the health care system

BUT……

This does not mean that the health care system can not be an important part of the solution!!

Systematic interventions for all – equal chance

Targeted interventions to vulnerable groups – challenge the paragdigm that if we treat all equal the result is equal



"We'd now like to open the floor to shorter speeches disguised as questions."

• •