



Public Health  
England

Protecting and improving the nation's health

# **National Cancer Intelligence Network**

**Relative survival in Upper  
Gastrointestinal (UGI) cancer patients in  
England, by socioeconomic deprivation**

## About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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## The intelligence networks

Public Health England operates a number of intelligence networks, which work with partners to develop world-class population health intelligence to help improve local, national and international public health systems.

### **National Cancer Intelligence Network**

The National Cancer Intelligence Network (NCIN) is a UK-wide initiative, working to drive improvements in standards of cancer care and clinical outcomes by improving and using the information collected about cancer patients for analysis, publication and research.

### **National Cardiovascular Intelligence Network**

The National Cardiovascular Intelligence Network (NCVIN) analyses information and data and turns it into meaningful timely health intelligence for commissioners, policy makers, clinicians and health professionals to improve services and outcomes.

### **National Child and Maternal Health Intelligence Network**

The National Child and Maternal Health Intelligence Network provides information and intelligence to improve decision-making for high-quality, cost-effective services. Its work supports policy makers, commissioners, managers, regulators, and other health stakeholders working on children's, young people's and maternal health.

### **National Mental Health, Dementia and Neurology Intelligence Network**

The National Mental Health Intelligence Networks (NMHDNIN) brings together the distinct National Mental Health Intelligence Network, the Dementia Intelligence Network and the Neurology Intelligence Network under a single programme. The Networks work in partnership with key stakeholder organisations. The Networks seeks to put information and intelligence into the hands of decision makers to improve mental health and wellbeing, support the reduction of risk and improve the lives of people living with dementia and improve neurology services.

### **National End of Life Care Intelligence Network**

The National End of Life Care Intelligence Network (NEoLCIN) aims to improve the collection and analysis of information related to the quality, volume and costs of care provided by the NHS, social services and the third sector to adults approaching the end of life. This intelligence will help drive improvements in the quality and productivity of services.

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## Executive summary

This report investigates whether there are differences in survival between different socioeconomic groups in upper gastrointestinal cancer patients in England. The survival of upper gastrointestinal cancer patients was examined using relative survival overall and for different periods of follow-up including up to one month, one month to one year, and one year or more after diagnosis.

One-year survival was lower in the more deprived areas than the less deprived areas for biliary tract cancer, oesophageal cancer and pancreatic cancer in both males and females, for duodenal cancer in females and stomach cancer in males. While it was not significant, male gallbladder cancer patients also showed a lower one-year survival in the most deprived group. For the other cancer sites one-year relative survival was similar between the socioeconomic groups.

Generally there were no differences in five-year relative survival between different socioeconomic deprivation groups.

Within the three follow-up time periods studied, there were generally associations between survival and deprivation in the short-term and intermediate periods, however, the trend tended to be strongest in the intermediate period, one month to one year after diagnosis. For pancreatic cancer in males and females, gallbladder cancer in males and biliary tract cancer in females there was a positive association between survival and deprivation in the long-term period, although this was only statistically significant for biliary tract cancer in females.

There is a need to develop strategies to improve survival from these cancers in England. Although not found in all upper gastrointestinal cancer sites, there was a tendency for survival to be lower in more deprived areas, particularly in the first year after diagnosis. This could possibly be a result of more patients being diagnosed with advanced disease in more deprived areas. Increasing awareness of early signs and symptoms of these cancers especially in more deprived groups could help patients to be diagnosed at an earlier stage. This could plausibly lead to better survival.

Further detailed analysis is required to understand why these differences exist and could take into account treatment received, patients' comorbidity and stage of disease at diagnosis to understand the influence of these factors on socioeconomic deprivation and survival.

## Introduction

The National Cancer Intelligence Network (NCIN) Upper Gastrointestinal Cancer Site Specific Clinical Reference Group (UGI SSCRG) is responsible for analyses of national data for oesophago-gastric (OG) cancers (including oesophageal and stomach cancer) and primary hepatic, pancreatic and biliary (HPB) cancers (including primary liver, biliary tract, Ampulla of Vater, duodenal, gallbladder and pancreatic cancer).

Previous studies, produced on behalf of this group, investigated incidence and survival for these upper gastrointestinal cancer sites in England and in general, the incidence rates were higher in the more deprived areas.<sup>1,2</sup>

Overall, survival is poor for all upper gastrointestinal cancer sites<sup>1,2</sup> although little is known about differences in relative survival for these cancer sites between different socioeconomic deprivation quintiles, however, a previous study investigating colorectal cancer survival in England found that survival was lower in more deprived areas than in the less deprived areas in all age groups and that this difference was most pronounced in the first month after diagnosis.<sup>3</sup>

This work aims to examine whether there are differences in survival between socioeconomic deprivation groups in upper gastrointestinal cancer patients in England. The survival in upper gastrointestinal cancer patients will be examined overall and for different periods of follow-up including up to one month, one month to one year and one year or more after diagnosis.

## Methods

Information on 64,913 oesophageal and gastric cancers and 59,182 hepatic, pancreatic and biliary cancers diagnosed in England between 2006 and 2010 was extracted from the National Cancer Data Repository dataset. Death information was obtained from the Office for National Statistics (ONS). Registrations made using only death certificate information were excluded. Where a patient had more than one tumour, the earliest diagnosed in the period was analysed, and all subsequent tumours were excluded. Table 1 shows the number of exclusions for each cancer before analysis.

**Table 1. Upper gastrointestinal cancer sites with corresponding ICD10 codes and exclusion criteria applied to the dataset prior to analysis**

Cancer site	International Classification of Diseases version 10 (ICD-10)	Number of tumours	Death Certificate Only registrations excluded	Subsequent tumours excluded	Number of patients for analysis
Oesophageal cancer <sup>1</sup>	C15	33,683	618	126	32,938
Stomach cancer	C16	31,230	844	126	30,260
Duodenal cancer	C17.0	1,845	45	5	1,795
Liver cancer (excluding intrahepatic bile duct)	C22.0, C22.2-C22.9	9,497	678	16	8,803
Biliary tract cancer (including intra- and extrahepatic bile duct) <sup>1</sup>	C22.1, C24.0, C24.8-C24.9	8,527	465	13	8,048
Gallbladder cancer	C23	2,840	155	5	2,680
Ampulla of Vater cancer	C24.1	1,809	20	3	1,786
Pancreatic cancer <sup>1</sup>	C25	34,664	2,057	96	32,510

<sup>1</sup>One patient with a diagnosis date after their date of death was excluded

Patients were assigned to an area of deprivation based on their postcode of residence when diagnosed. To categorise areas of deprivation, the income domain of the 2007 and 2010 Indices of Deprivation (ID) was used. A score is generated for each small geographical area (lower super output area) with a population of around 1,500 people, allowing each area to be ranked relative to one another in terms of their level of deprivation. These individual scores were grouped into quintiles of socioeconomic deprivation ranging from 1 (least deprived) to 5 (most deprived). The 2007 ID<sup>4</sup> was used

for patients diagnosed in 2006 and the 2010; ID<sup>5</sup> was used for patients diagnosed between 2007 and 2010.

For each cancer site the number and proportion of patients by sex and socioeconomic deprivation was generated. The Chi-squared statistic was used to test for trend between socioeconomic deprivation and sex.

One-year and five-year relative survival was calculated using the Stata command `strs` developed by Dickman.<sup>6</sup> Patients with a survival time of zero days were considered to have half-a-day survival and all patients were followed up until the date of death or censor date on 31 December 2011. Sex-, age- and ID income domain-specific life tables for 2006 to 2009 (available from the London School of Hygiene and Tropical Medicine website) were used. As life tables were not available for the most recent year (2010) the values for 2009 were used. Also, interval specific relative survival in the different time periods following date of diagnosis was assessed; up to one month, one month to one year and one year or more after diagnosis.

The trend of relative survival estimates was assessed using linear regression of survival on deprivation. The p-values and predicted relative survival estimates from these models were plotted on the survival graphs.

## Results

The number and proportion of patients by sex and socioeconomic deprivation for each cancer site are listed in Table 2.

The proportion of patients increased with increasing socioeconomic deprivation for stomach and liver cancer in both males and females.

The proportion of patients was higher in more deprived areas for biliary tract cancer and gallbladder cancer in females, although there was little difference between quintiles two to five.

The proportion of patients in the least deprived quintile was lower for oesophageal cancer in males and females, and duodenal cancer and Ampulla of Vater cancer in females.

In contrast, there were generally lower proportions of males with Ampulla of Vater and pancreatic cancer in the more deprived areas.

**Table 2. Number and proportion of patients diagnosed with upper gastrointestinal cancer between 2006 and 2010, by sex and socioeconomic deprivation, England**

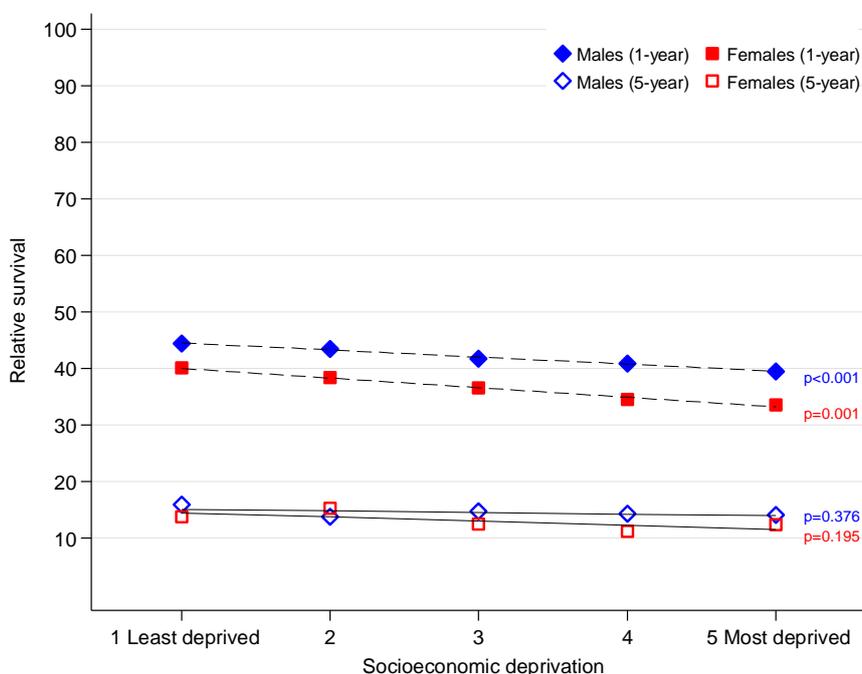
Cancer site	Sex		Socioeconomic deprivation					$\chi^2$ (1df)	p-value
			1 least deprived	2	3	4	5 most deprived		
Oesophageal cancer	Male	n	3,765	4,680	4,694	4,642	4,095	0.10	0.757
		%	17.2	21.4	21.5	21.2	18.7		
	Female	n	1,888	2,333	2,400	2,404	2,037	20.83	<0.001
		%	17.1	21.1	21.7	21.7	18.4		
Stomach cancer	Male	n	3,292	3,868	4,048	4,201	4,293	20.83	<0.001
		%	16.7	19.6	20.6	21.3	21.8		
	Female	n	1,615	1,980	2,171	2,315	2,477	3.16	0.076
		%	15.3	18.8	20.6	21.9	23.5		
Duodenal cancer	Male	n	218	177	195	211	181	3.16	0.076
		%	22.2	18.0	19.9	21.5	18.4		
	Female	n	143	150	186	169	165	5.14	0.023
		%	17.6	18.5	22.9	20.8	20.3		
Liver cancer (excluding intrahepatic bile duct)	Male	n	998	1,162	1,270	1,412	1,644	5.14	0.023
		%	15.4	17.9	19.6	21.8	25.4		
	Female	n	395	421	469	481	551	9.67	0.002
		%	17.1	18.2	20.2	20.8	23.8		
Biliary tract cancer (including intra- and extrahepatic bile duct)	Male	n	748	842	803	759	731	9.67	0.002
		%	19.3	21.7	20.7	19.6	18.8		
	Female	n	731	853	857	856	868	1.11	0.292
		%	17.6	20.5	20.6	20.6	20.8		
Gallbladder cancer	Male	n	148	151	148	165	161	1.11	0.292
		%	19.2	19.5	19.2	21.4	20.8		
	Female	n	308	394	387	408	410	5.31	0.021
		%	16.2	20.7	20.3	21.4	21.5		
Ampulla of Vater cancer	Male	n	220	193	219	178	166	5.31	0.021
		%	22.5	19.8	22.4	18.2	17.0		
	Female	n	134	176	183	170	147	14.13	<0.001
		%	16.5	21.7	22.6	21.0	18.2		
Pancreatic cancer	Male	n	3,254	3,502	3,416	3,130	2,726	14.13	<0.001
		%	20.3	21.9	21.3	19.5	17.0		
	Female	n	3,021	3,602	3,613	3,375	2,871	14.13	<0.001
		%	18.3	21.9	21.9	20.5	17.4		

## 1. Oesophageal cancer

**Table 1.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with oesophageal cancer between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	44.5	(42.8-46.1)	40.1	(37.8-42.3)
	2	43.5	(42.0-45.0)	38.4	(36.3-40.4)
	3	41.8	(40.3-43.2)	36.6	(34.6-38.6)
	4	40.9	(39.4-42.3)	34.5	(32.6-36.5)
	5 (most deprived)	39.5	(38.0-41.1)	33.6	(31.5-35.7)
Five-year relative survival	1 (least deprived)	15.9	(14.3-17.6)	13.8	(11.7-16.0)
	2	13.7	(12.3-15.2)	15.3	(13.4-17.3)
	3	14.7	(13.4-16.2)	12.4	(10.7-14.3)
	4	14.3	(12.8-15.8)	11.1	(9.4-13.0)
	5 (most deprived)	14.1	(12.6-15.7)	12.4	(10.5-14.4)

**Figure 1.1. One-year and five-year relative survival (%) for oesophageal cancer patients diagnosed between 2006 and 2010, by sex and deprivation, England**

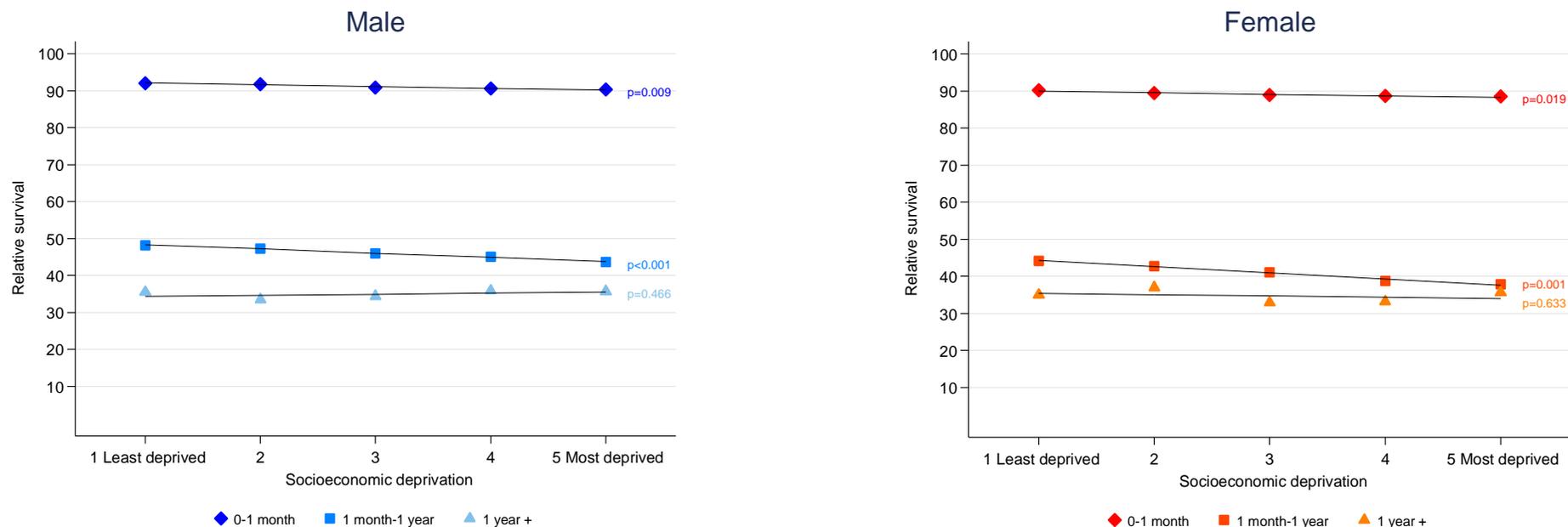


- one-year relative survival was higher in males than in females in all socioeconomic deprivation groups, but five-year survival was similar for males and females
- one-year relative survival decreased with increasing socioeconomic deprivation
- five-year relative survival was similar in all socioeconomic deprivation groups

**Table 1.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with oesophageal cancer between 2006 and 2010, by sex, deprivation and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
<b>1 (least deprived)</b>	92.0	(91.1-92.9)	90.2	(88.8-91.5)	48.2	(46.5-49.9)	44.2	(41.8-46.7)	35.5	(32.6-38.4)	35.0	(30.7-39.4)
<b>2</b>	91.8	(91.0-92.6)	89.4	(88.0-90.6)	47.3	(45.8-48.8)	42.8	(40.6-45.0)	33.5	(30.9-36.1)	37.0	(32.9-41.1)
<b>3</b>	90.8	(89.9-91.6)	88.9	(87.5-90.1)	45.9	(44.3-47.4)	41.1	(38.9-43.2)	34.4	(31.7-37.1)	32.9	(29.0-37.0)
<b>4</b>	90.6	(89.7-91.4)	88.7	(87.3-89.9)	45.0	(43.5-46.6)	38.8	(36.7-41.0)	35.9	(33.1-38.7)	33.2	(29.1-37.4)
<b>5 (most deprived)</b>	90.3	(89.3-91.2)	88.5	(87.0-89.9)	43.7	(42.1-45.4)	37.8	(35.5-40.2)	35.7	(32.6-38.8)	35.6	(31.0-40.3)

**Figure 1.2. Relative survival (%) for oesophageal cancer patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England**



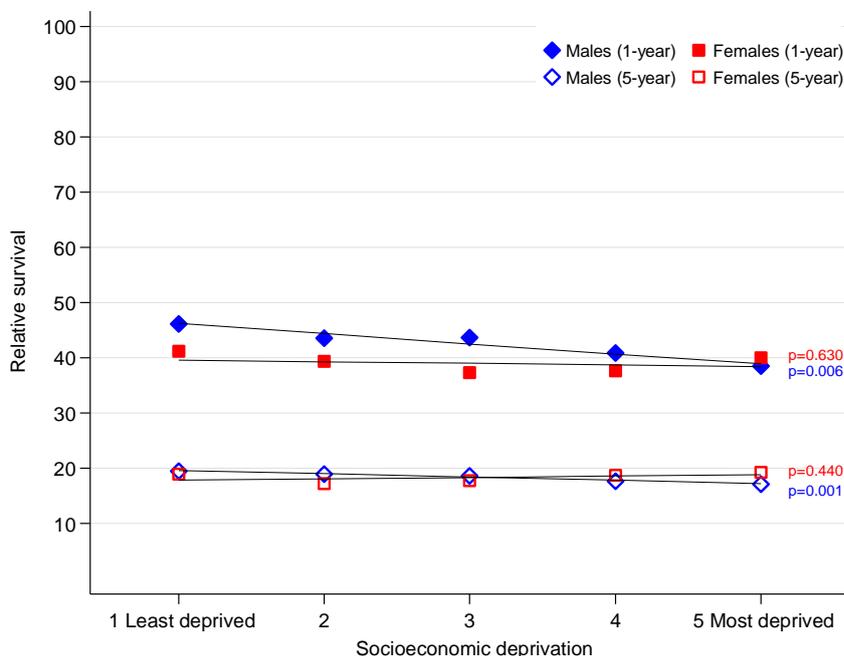
- in both males and females, relative survival was lower in more deprived than less deprived areas in the short and intermediate term, but not in the longer term. The difference was greatest in the intermediate period

## 2. Stomach cancer

**Table 2.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with stomach cancer between 2006 and 2010, by sex and deprivation, England.**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	46.2	(44.4-47.9)	41.2	(38.7-43.6)
	2	43.6	(42.0-45.2)	39.4	(37.1-41.6)
	3	43.6	(42.0-45.2)	37.3	(35.2-39.5)
	4	40.8	(39.3-42.4)	37.7	(35.6-39.7)
	5 (most deprived)	38.5	(36.9-40.0)	40.0	(38.0-42.0)
Five-year relative survival	1 (least deprived)	19.5	(17.7-21.4)	19.0	(16.5-21.6)
	2	19.0	(17.3-20.7)	17.2	(14.9-19.7)
	3	18.6	(16.9-20.4)	17.8	(15.7-19.9)
	4	17.7	(16.1-19.3)	18.7	(16.6-20.9)
	5 (most deprived)	17.1	(15.6-18.8)	19.2	(17.1-21.4)

**Figure 2.1. One-year and five-year relative survival (%) for stomach cancer patients diagnosed between 2006 and 2010, by sex and deprivation, England.**

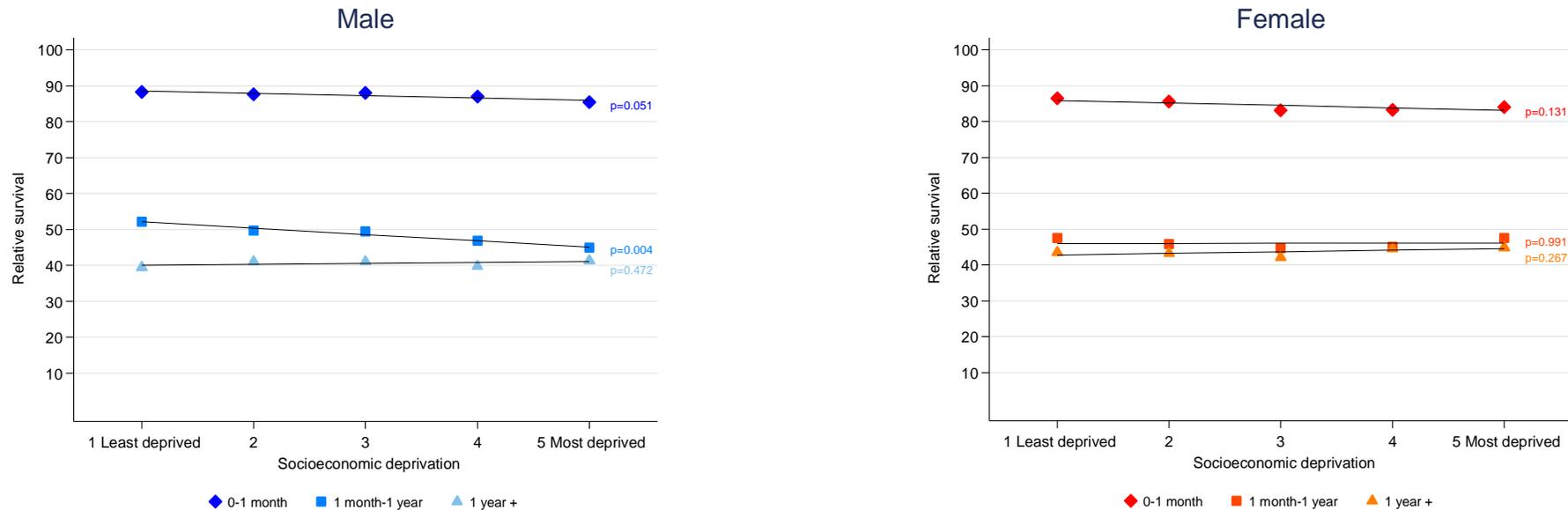


- one-year survival estimates were higher in males than in females in deprivation quintiles one to four. In the most deprived group the survival estimate was slightly higher in females (40.0%, 95%CI 38.0%-42.0%) than males (38.5%, 95%CI 36.9%-40.0%)
- one- and five-year relative survival was lower in more deprived areas than in less deprived areas in males; the difference in one-year survival was greater
- relative survival was similar in all socioeconomic deprivation groups in females

**Table 2.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with stomach cancer between 2006 and 2010, by sex, deprivation and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1 year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
1 (least deprived)	88.3	(87.1-89.3)	86.4	(84.6-88.0)	52.2	(50.3-54.1)	47.5	(44.8-50.2)	39.5	(36.2-42.7)	43.5	(38.5-48.5)
2	87.6	(86.5-88.6)	85.5	(83.9-87.0)	49.7	(47.9-51.4)	45.8	(43.4-48.3)	41.0	(37.9-44.2)	43.3	(38.6-48.0)
3	88.0	(86.9-88.9)	83.2	(81.5-84.7)	49.5	(47.8-51.2)	44.7	(42.3-47.1)	41.1	(37.9-44.2)	42.1	(37.5-46.8)
4	87.0	(85.9-88.0)	83.3	(81.7-84.7)	46.8	(45.1-48.5)	45.0	(42.7-47.3)	39.7	(36.5-42.9)	44.6	(40.0-49.2)
5 (most deprived)	85.4	(84.3-86.4)	84.0	(82.5-85.4)	44.9	(43.3-46.6)	47.5	(45.2-49.7)	41.3	(38.0-44.7)	44.9	(40.5-49.2)

**Figure 2.2. Relative survival (%) for stomach cancer patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England.**



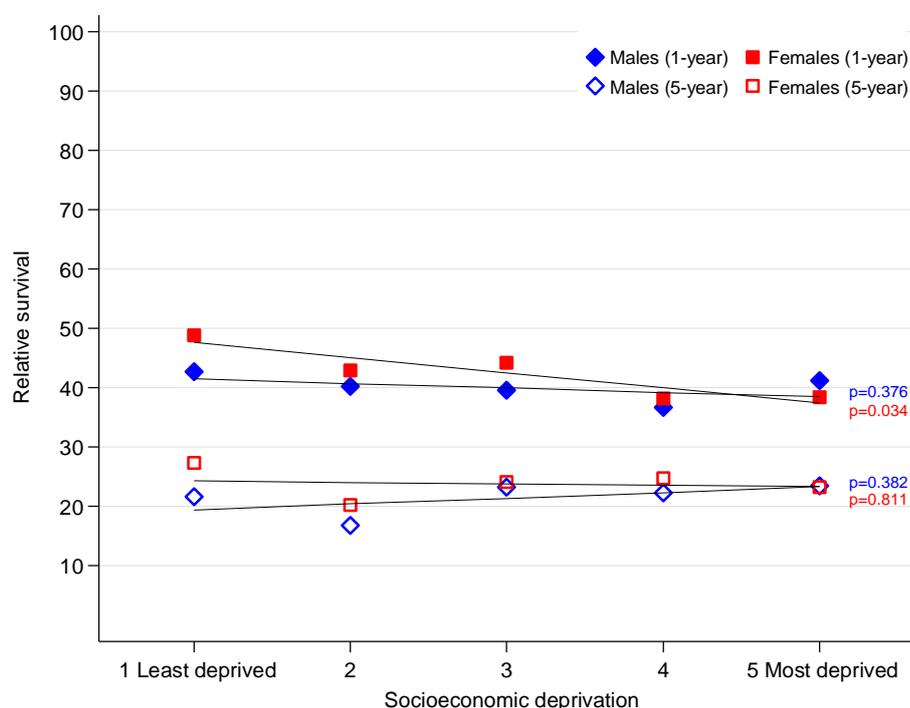
- in males, relative survival was lower in more deprived than less deprived areas in the short and intermediate term, but not in the longer term. The difference was greatest in the intermediate period
- in females, there were no differences between survival in all socioeconomic deprivation groups in all three time periods

### 3. Duodenal cancer

**Table 3.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with duodenal cancer between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	42.7	(35.9-49.3)	48.9	(40.3-57.0)
	2	40.2	(32.7-47.5)	42.9	(34.7-50.9)
	3	39.6	(32.5-46.6)	44.2	(36.7-51.4)
	4	36.7	(30.0-43.4)	38.2	(30.7-45.7)
	5 (most deprived)	41.2	(33.7-48.6)	38.4	(30.8-46.1)
Five-year relative survival	1 (least deprived)	21.6	(14.5-29.9)	27.4	(17.8-38.1)
	2	16.8	(10.5-24.5)	20.2	(12.0-30.0)
	3	23.2	(16.1-31.2)	24.1	(16.8-32.3)
	4	22.2	(14.5-31.2)	24.7	(16.8-33.6)
	5 (most deprived)	23.5	(15.3-33.0)	23.2	(15.7-31.8)

**Figure 3.1. One-year and five-year relative survival (%) for duodenal cancer patients diagnosed between 2006 and 2010, by sex and deprivation, England**

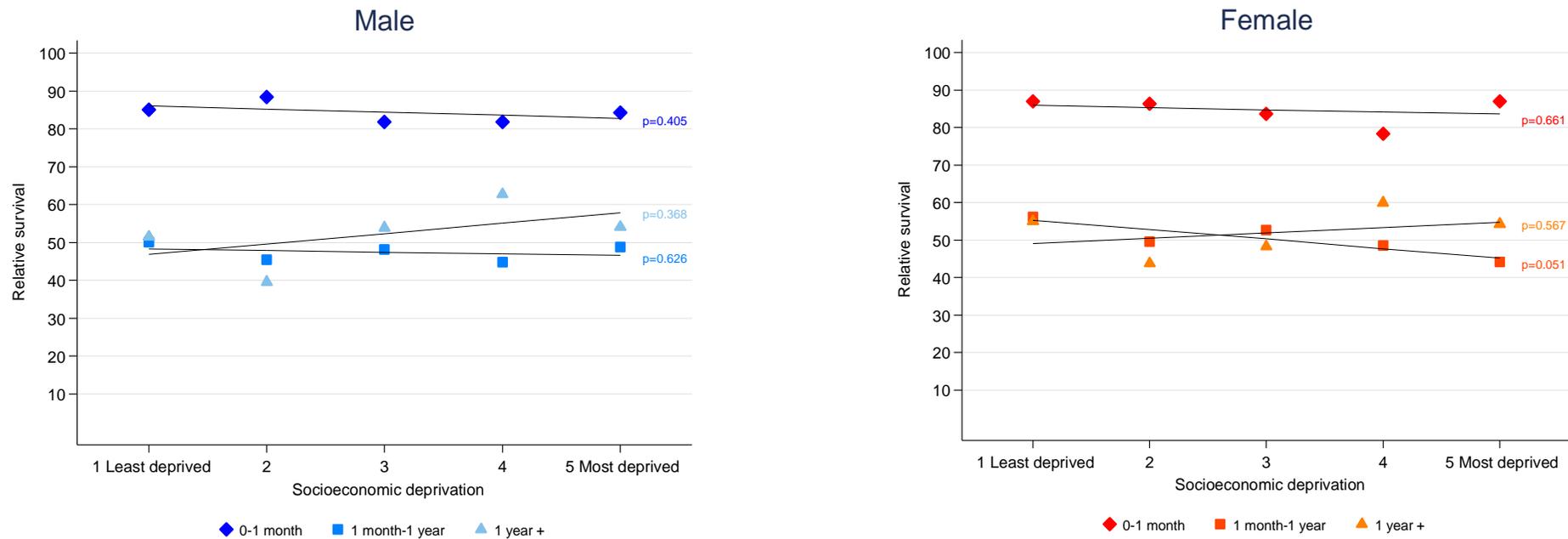


- one-year survival estimates were higher in females than in males in deprivation groups one to four. In the most deprived areas survival was slightly higher in males (41.2%, 95%CI 33.7%-48.6%) than females (38.4%, 95%CI 30.8%-46.1%)
- in females, one-year relative survival was lower in more deprived than less deprived areas, but this pattern was not found in males
- there were no differences between socioeconomic deprivation and five-year survival in both males and females

**Table 3.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with duodenal cancer between 2006 and 2010, by sex, deprivation and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
<b>1 (least deprived)</b>	85.1	(79.6-89.2)	86.9	(80.2-91.5)	50.1	(42.5-57.2)	56.2	(46.8-64.6)	51.5	(37.3-64.6)	55.0	(38.2-70.0)
<b>2</b>	88.4	(82.6-92.4)	86.3	(79.6-90.9)	45.4	(37.3-53.3)	49.5	(40.4-58.1)	39.6	(25.1-54.4)	43.7	(28.0-59.2)
<b>3</b>	81.8	(75.6-86.6)	83.6	(77.4-88.3)	48.2	(40.0-56.0)	52.7	(44.3-60.5)	53.9	(37.6-68.8)	48.3	(33.4-62.5)
<b>4</b>	81.8	(75.9-86.5)	78.4	(71.3-83.9)	44.8	(37.0-52.3)	48.5	(39.5-57.0)	62.7	(45.4-77.5)	60.0	(41.6-75.7)
<b>5 (most deprived)</b>	84.3	(78.1-89.0)	87.0	(80.7-91.3)	48.8	(40.3-56.8)	44.1	(35.7-52.3)	54.1	(37.0-70.0)	54.3	(36.2-70.6)

**Figure 3.2. Relative survival (%) for duodenal cancer patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England.**



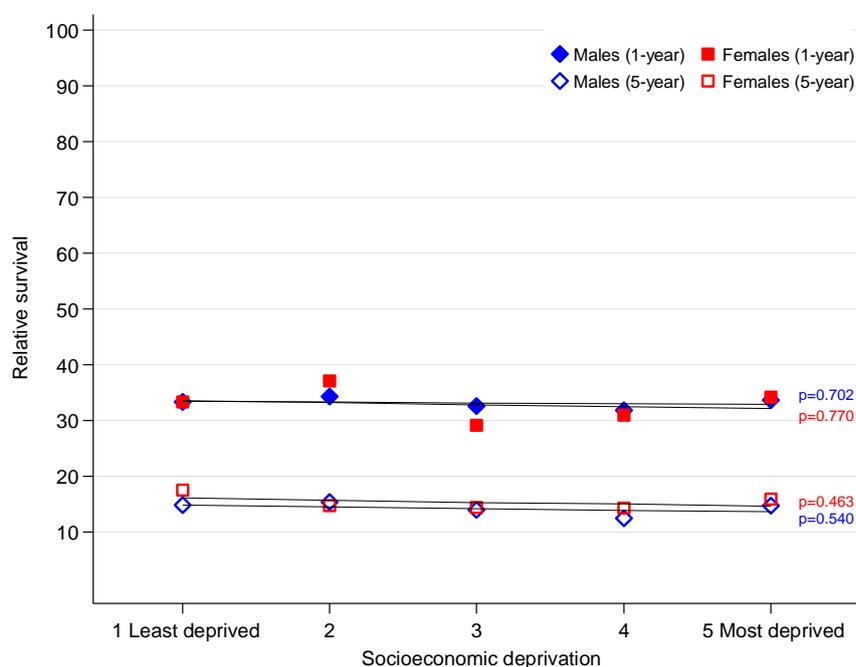
- in general, there were no significant linear associations between socioeconomic deprivation and survival in all three time periods for males, partly due to the small numbers of patients
- in females, relative survival was lower in more deprived than less deprived areas in the intermediate period

#### 4. Liver cancer (excluding intrahepatic bile duct)

**Table 4.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with liver cancer (excluding intrahepatic bile duct) between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	33.3	(30.3-36.3)	33.4	(28.7-38.1)
	2	34.3	(31.5-37.1)	37.1	(32.4-41.9)
	3	32.6	(30.0-35.3)	29.2	(25.0-33.5)
	4	31.9	(29.4-34.4)	31.0	(26.8-35.3)
	5 (most deprived)	33.6	(31.3-36.0)	34.2	(30.1-38.3)
Five-year relative survival	1 (least deprived)	14.9	(11.7-18.5)	17.6	(13.3-22.4)
	2	15.3	(12.6-18.4)	14.7	(10.1-20.1)
	3	13.9	(11.3-16.8)	14.4	(10.5-18.9)
	4	12.4	(10.1-15.0)	14.3	(10.5-18.8)
	5 (most deprived)	14.8	(12.3-17.4)	16.0	(11.7-20.9)

**Figure 4.1. One-year and five-year relative survival (%) for liver cancer (excluding intrahepatic bile duct) patients diagnosed between 2006 and 2010, by sex and deprivation, England**

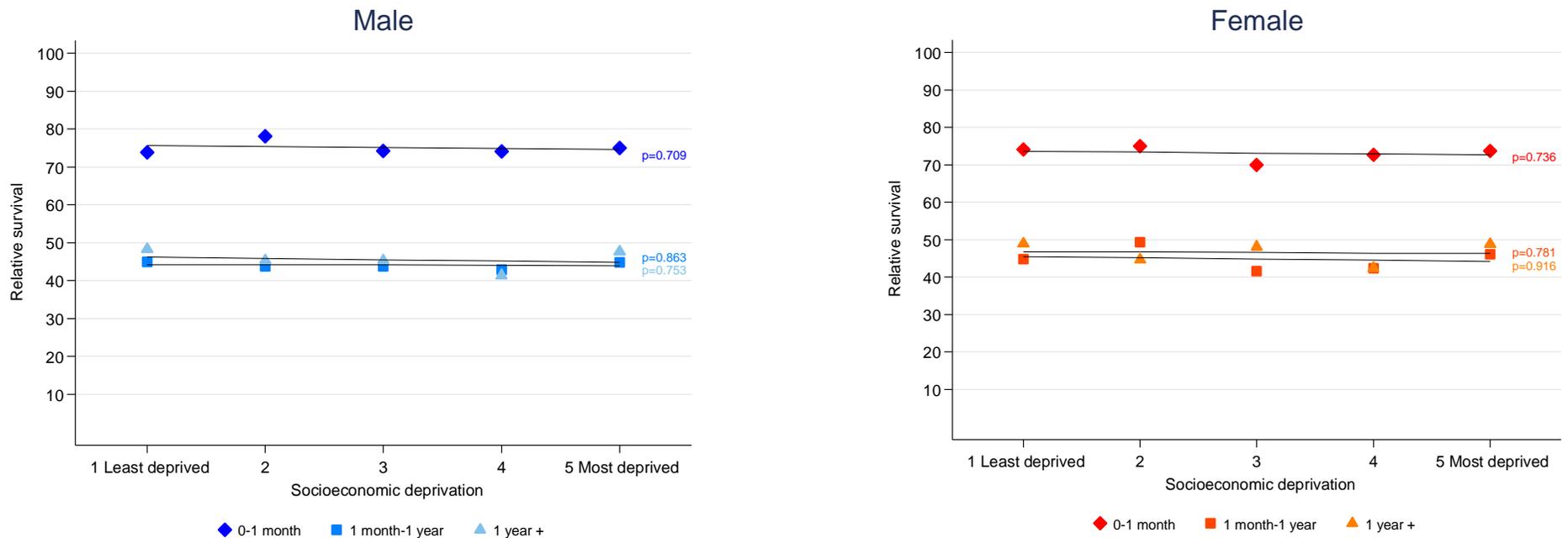


- males and females had similar one- and five-year relative survival estimates
- there were no differences in one- and five-year relative survival between socioeconomic deprivation groups for both males and females

**Table 4.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with liver cancer (excluding intrahepatic bile duct) between 2006 and 2010, by sex, deprivation, and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
1 (least deprived)	73.9	(71.0-76.5)	74.1	(69.5-78.2)	45.0	(41.3-48.6)	44.7	(38.9-50.5)	48.2	(40.9-55.4)	49.0	(37.5-59.7)
2	78.1	(75.6-80.4)	75.0	(70.6-78.9)	43.8	(40.5-47.1)	49.3	(43.5-54.8)	45.3	(38.7-51.7)	44.7	(34.4-54.7)
3	74.2	(71.6-76.5)	69.9	(65.6-73.9)	43.8	(40.5-47.0)	41.5	(36.0-46.9)	45.3	(38.8-51.7)	48.1	(36.7-58.9)
4	74.1	(71.7-76.3)	72.6	(68.4-76.4)	42.9	(39.8-46.0)	42.4	(37.1-47.7)	41.4	(35.4-47.4)	42.4	(32.0-52.8)
5 (most deprived)	74.9	(72.8-77.0)	73.8	(69.8-77.2)	44.8	(41.9-47.7)	46.1	(41.1-51.1)	47.6	(41.8-53.3)	48.8	(39.0-58.2)

**Figure 4.2. Relative survival (%) for liver cancer (excluding intrahepatic bile duct) patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England**



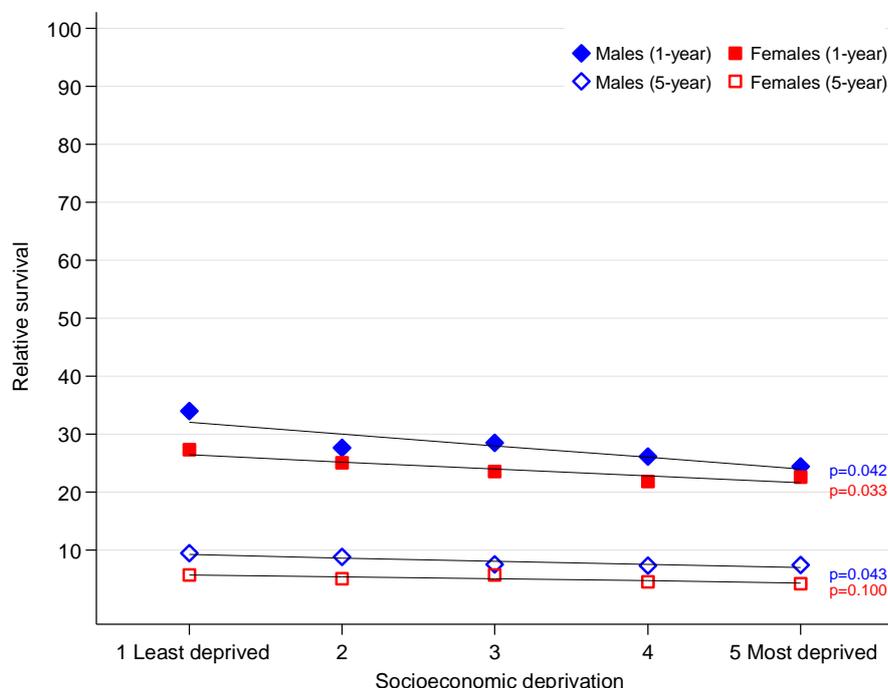
- there were no differences in survival between socioeconomic deprivation groups in all three time periods for both males and females

## 5. Biliary tract cancer (including intra- and extrahepatic bile duct)

**Table 5.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with biliary tract cancer (including intra- and extrahepatic bile duct) between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	34.0	(30.6-37.5)	27.3	(24.0-30.6)
	2	27.7	(24.6-30.8)	25.0	(22.1-28.0)
	3	28.5	(25.3-31.8)	23.6	(20.7-26.6)
	4	26.1	(22.9-29.4)	21.8	(19.0-24.7)
	5 (most deprived)	24.4	(21.2-27.7)	22.6	(19.8-25.5)
Five-year relative survival	1 (least deprived)	9.5	(6.9-12.5)	5.6	(3.6-8.4)
	2	8.8	(6.2-11.9)	5.1	(3.2-7.6)
	3	7.5	(5.1-10.5)	5.7	(3.7-8.1)
	4	7.3	(4.8-10.4)	4.5	(2.7-7.0)
	5 (most deprived)	7.5	(5.1-10.4)	4.2	(2.3-7.1)

**Figure 5.1. One-year and five-year relative survival (%) for biliary tract cancer (including intra- and extrahepatic bile duct) patients diagnosed between 2006 and 2010, by sex and deprivation, England**

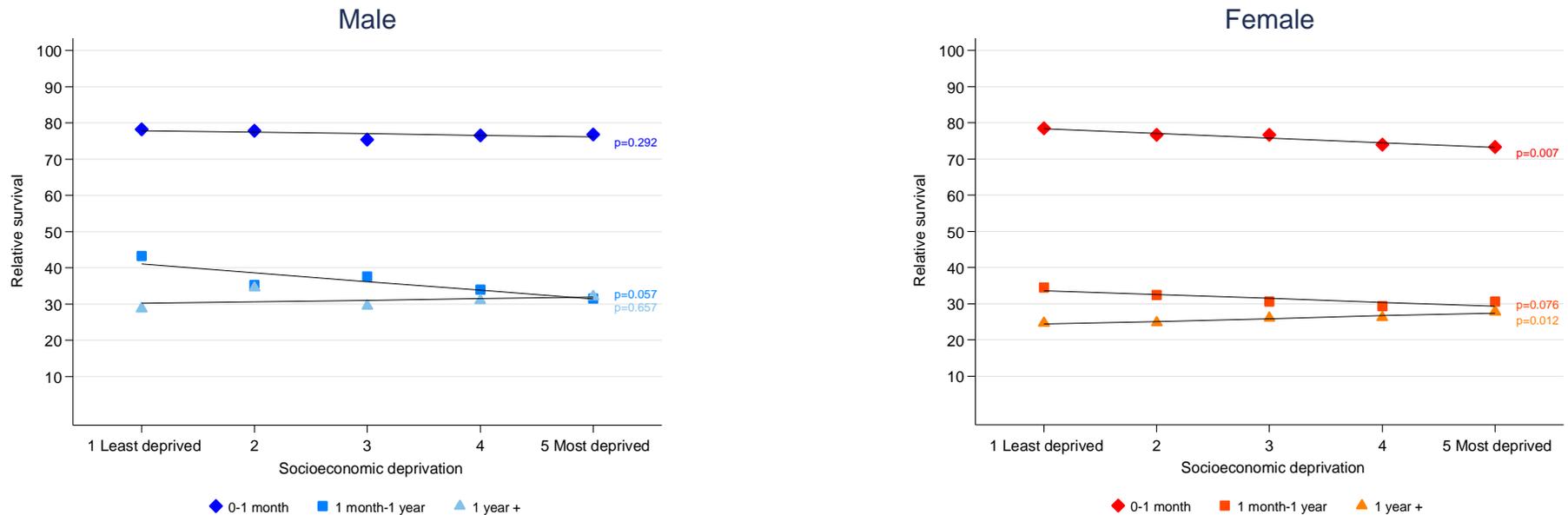


- In males, one- and five-year relative survival was lower in more deprived than less deprived areas.
- In females, one-year relative survival was lower in more deprived areas. For five-year survival there was no significant association with socioeconomic deprivation.

**Table 5.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with biliary tract cancer (including intra- and extrahepatic bile duct) between 2006 and 2010, by sex, deprivation and period of follow-up England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
1 (least deprived)	78.2	(75.0-81.0)	78.5	(75.3-81.3)	43.3	(39.2-47.4)	34.5	(30.6-38.5)	28.7	(22.1-35.8)	24.7	(17.9-32.2)
2	77.9	(74.9-80.5)	76.7	(73.7-79.4)	35.3	(31.6-39.1)	32.4	(28.8-36.1)	34.5	(26.8-42.5)	24.8	(18.2-32.2)
3	75.4	(72.3-78.3)	76.6	(73.6-79.3)	37.6	(33.6-41.5)	30.6	(27.1-34.3)	29.5	(22.3-37.2)	26.1	(19.0-33.8)
4	76.5	(73.3-79.4)	74.0	(70.9-76.8)	33.9	(30.0-38.0)	29.3	(25.7-33.0)	31.0	(23.1-39.5)	26.2	(18.8-34.4)
5 (most deprived)	76.8	(73.6-79.7)	73.3	(70.2-76.2)	31.6	(27.6-35.6)	30.7	(27.0-34.4)	32.1	(23.5-41.3)	27.8	(20.3-36.0)

**Figure 5.2. Relative survival (%) for biliary tract cancer (including intra- and extrahepatic bile duct) patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England**



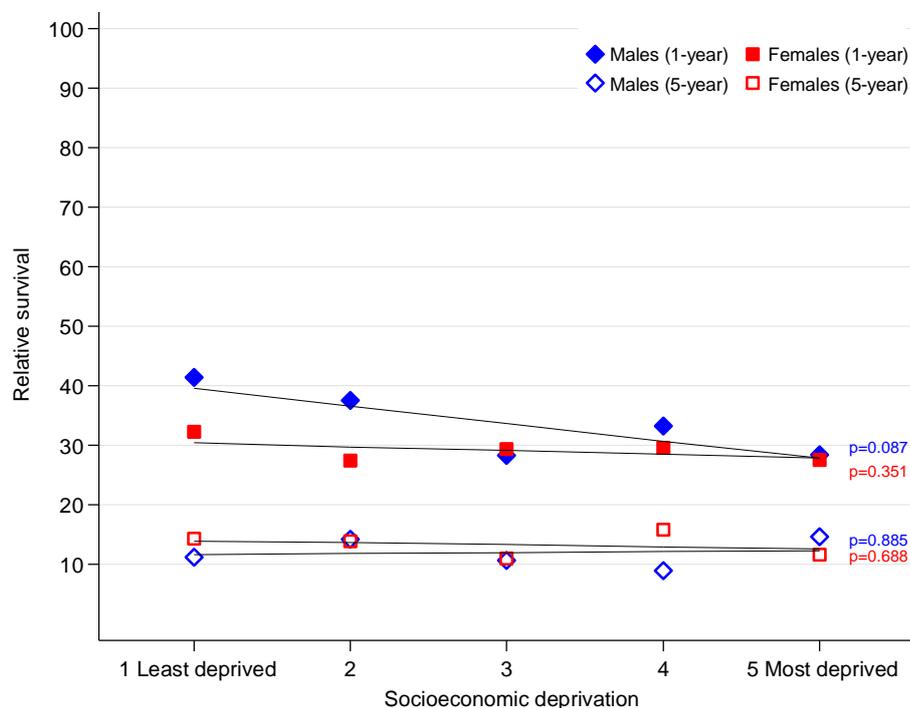
- in males, relative survival was lower in more deprived than less deprived areas in the intermediate period
- in females, relative survival was lower in more deprived than less deprived areas in the short term and intermediate period although the difference was not statistically significant in the latter. In contrast, survival was higher in more deprived areas in the long term period

## 6. Gallbladder cancer

**Table 6.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with gallbladder cancer between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
<b>One-year relative survival</b>	<b>1 (least deprived)</b>	41.4	(33.2-49.5)	32.3	(27.0-37.7)
	<b>2</b>	37.5	(29.6-45.5)	27.5	(23.0-32.1)
	<b>3</b>	28.3	(21.1-36.0)	29.3	(24.7-34.0)
	<b>4</b>	33.2	(25.9-40.7)	29.5	(25.1-34.1)
	<b>5 (most deprived)</b>	28.4	(21.4-35.8)	27.5	(23.1-32.0)
<b>Five-year relative survival</b>	<b>1 (least deprived)</b>	11.2	(4.9-20.6)	14.3	(9.3-20.4)
	<b>2</b>	14.2	(8.1-22.1)	13.8	(9.9-18.5)
	<b>3</b>	10.6	(5.4-17.9)	10.9	(7.0-15.9)
	<b>4</b>	8.9	(3.2-18.5)	15.8	(11.8-20.4)
	<b>5 (most deprived)</b>	14.6	(8.3-23.0)	11.7	(8.0-16.1)

**Figure 6.1. One-year and five-year relative survival (%) for gallbladder cancer patients diagnosed between 2006 and 2010, by sex and deprivation, England**

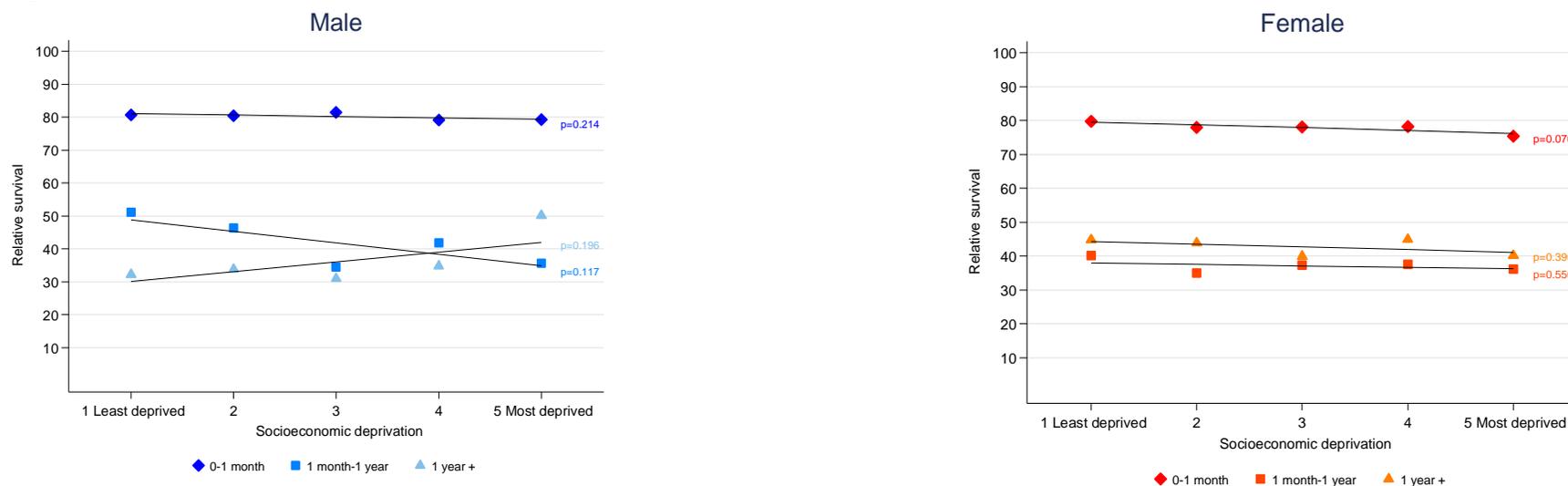


- in males, one-year survival was lower in the more deprived than less deprived areas, although this was a weak statistically significant association
- there was no association with socioeconomic deprivation in one-year survival for females, and in five-year survival for both males and females

**Table 6.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with gallbladder cancer between 2006 and 2010, by sex, deprivation and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
1 (least deprived)	80.7	(73.3-86.2)	79.8	(74.8-83.9)	51.2	(41.6-60.0)	40.2	(33.9-46.4)	32.2	(18.5-47.4)	44.8	(32.0-57.1)
2	80.5	(73.1-86.0)	77.9	(73.5-81.7)	46.3	(37.0-55.2)	35.0	(29.6-40.4)	33.8	(19.2-49.7)	43.9	(31.6-55.9)
3	81.4	(74.1-86.9)	78.0	(73.6-81.9)	34.5	(26.0-43.3)	37.3	(31.8-42.9)	31.0	(15.1-49.4)	40.0	(28.5-51.4)
4	79.1	(72.1-84.7)	78.2	(73.8-81.9)	41.9	(33.0-50.5)	37.5	(32.1-43.0)	34.8	(19.1-52.2)	44.9	(33.2-56.3)
5 (most deprived)	79.3	(72.1-84.9)	75.4	(70.9-79.3)	35.7	(27.2-44.4)	36.2	(30.8-41.7)	50.2	(29.1-70.4)	40.1	(28.4-52.0)

**Figure 6.2. Relative survival (%) for gallbladder cancer patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England**



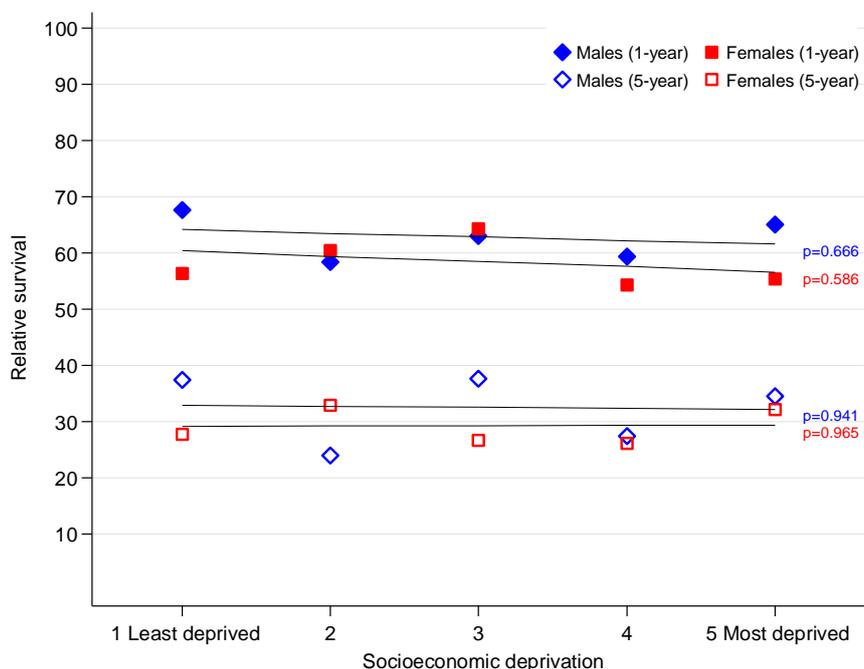
- in males, survival in the intermediate period was lower in the more deprived than less deprived areas, and in the longer term there was a positive association between survival and deprivation, but neither association was statistically significant. There was no difference in survival in the short-term
- in females, short-term survival was lower in the more deprived than less deprived areas, but this was weakly statistically significant. There was no association between survival and socioeconomic deprivation in the other time periods

## 7. Ampulla of Vater cancer

**Table 7.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with Ampulla of Vater cancer between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	67.7	(60.8-73.8)	56.4	(47.3-64.6)
	2	58.4	(50.8-65.4)	60.5	(52.6-67.6)
	3	63.0	(55.9-69.4)	64.3	(56.4-71.2)
	4	59.4	(51.5-66.6)	54.3	(46.2-61.9)
	5 (most deprived)	65.1	(56.9-72.3)	55.4	(46.6-63.4)
Five-year relative survival	1 (least deprived)	37.4	(28.7-46.3)	27.8	(18.2-38.5)
	2	24.0	(15.8-33.5)	32.9	(24.5-41.9)
	3	37.7	(29.5-46.1)	26.7	(17.6-37.0)
	4	27.4	(17.4-38.8)	26.1	(18.1-35.0)
	5 (most deprived)	34.5	(24.8-44.8)	32.2	(23.4-41.5)

**Figure 7.1. One-year and five-year relative survival (%) for Ampulla of Vater cancer patients diagnosed between 2006 and 2010, by sex and deprivation, England**

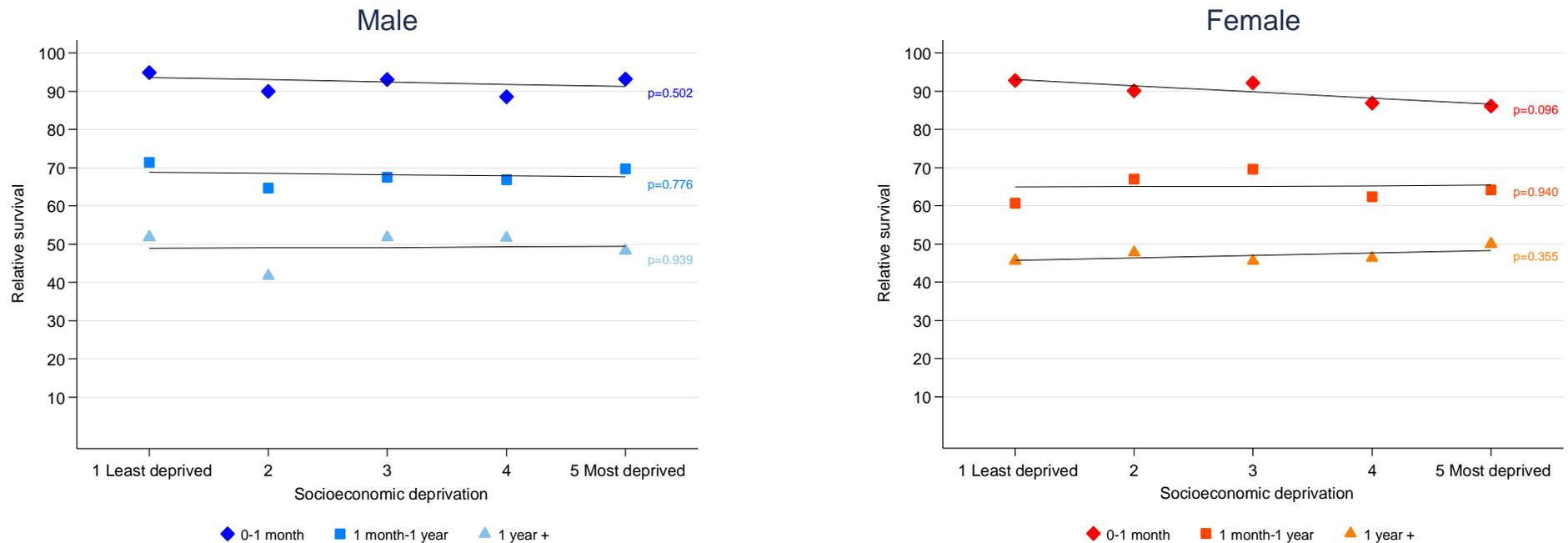


- There were no differences in both one- and five-year relative survival between the socioeconomic deprivation groups for either males or females.

**Table 7.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with Ampulla of Vater cancer between 2006 and 2010, by sex, deprivation and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
1 (least deprived)	94.8	(90.9-97.1)	92.8	(86.8-96.2)	71.3	(64.4-77.3)	60.6	(51.2-68.9)	51.8	(40.5-62.4)	45.6	(30.6-60.2)
2	90.0	(84.7-93.5)	90.0	(84.5-93.7)	64.7	(56.7-71.7)	67.0	(58.8-74.0)	41.7	(29.7-53.9)	47.8	(35.0-60.0)
3	93.0	(88.7-95.8)	92.2	(87.1-95.4)	67.5	(60.3-73.9)	69.5	(61.5-76.4)	51.8	(39.7-63.2)	45.6	(33.1-58.0)
4	88.6	(82.8-92.5)	86.8	(80.7-91.2)	66.9	(58.6-74.1)	62.4	(53.6-70.1)	51.6	(37.7-64.9)	46.4	(32.3-60.1)
5 (most deprived)	93.2	(88.0-96.2)	86.0	(79.2-90.8)	69.7	(61.4-76.9)	64.1	(54.7-72.2)	48.3	(35.0-61.2)	50.0	(34.4-65.0)

**Figure 7.2. Relative survival (%) for Ampulla of Vater cancer patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England**



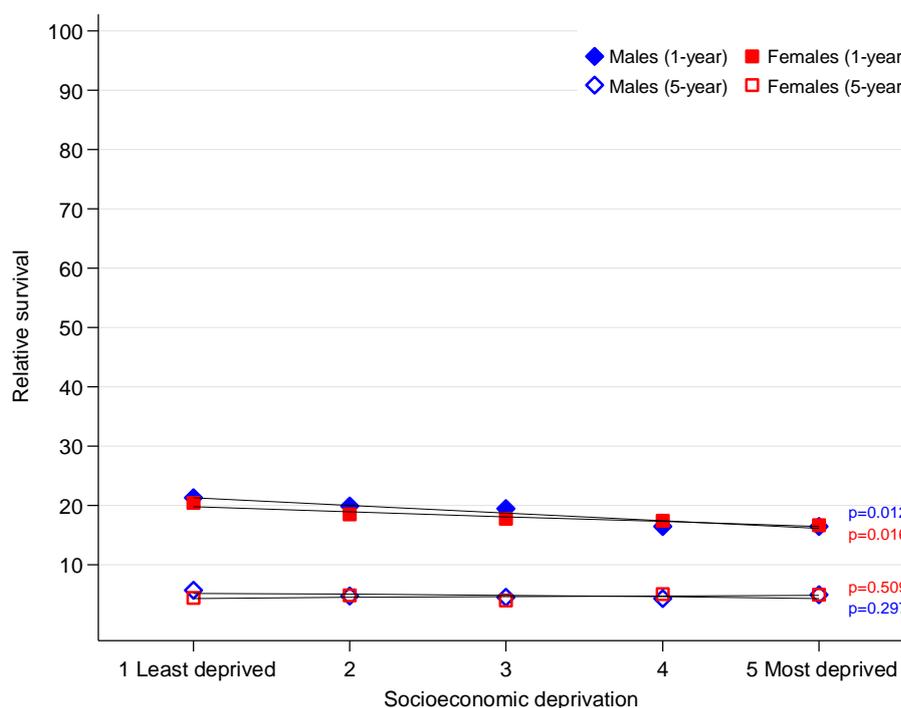
- There was no association between survival and socioeconomic deprivation in any of the time periods for either males or females.

## 8. Pancreatic cancer

**Table 8.1. One-year and five-year relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with pancreatic cancer between 2006 and 2010, by sex and deprivation, England**

	Socioeconomic deprivation	Male		Female	
		Relative survival	95% CI	Relative survival	95% CI
One-year relative survival	1 (least deprived)	21.3	(19.8-22.7)	20.4	(18.9-21.9)
	2	19.9	(18.6-21.3)	18.5	(17.2-19.8)
	3	19.5	(18.1-20.9)	17.7	(16.4-19.0)
	4	16.5	(15.2-17.9)	17.5	(16.2-18.8)
	5 (most deprived)	16.4	(15.0-17.9)	16.7	(15.3-18.1)
Five-year relative survival	1 (least deprived)	5.7	(4.6-6.9)	4.4	(3.4-5.6)
	2	4.8	(3.8-5.9)	4.8	(3.9-5.9)
	3	4.5	(3.6-5.6)	4.0	(3.2-4.9)
	4	4.3	(3.3-5.3)	5.0	(4.1-6.1)
	5 (most deprived)	5.0	(3.9-6.3)	5.0	(4.0-6.1)

**Figure 8.1. One-year and five-year relative survival (%) for pancreatic cancer patients diagnosed between 2006 and 2010, by sex and deprivation, England**

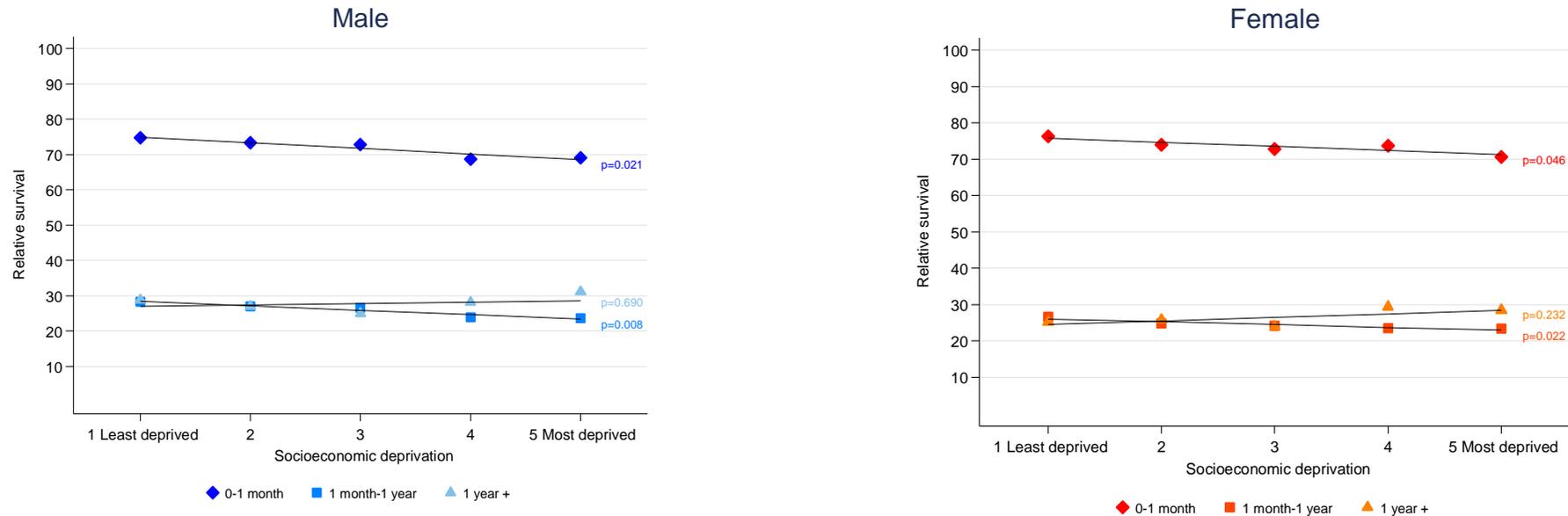


- one- and five-year relative survival was similar in males and females
- one-year relative survival was lower in more deprived than less deprived areas for both males and females
- there were no differences in five-year relative survival between socioeconomic deprivation groups

**Table 8.2. Relative survival (%) and 95% confidence intervals (CI) for patients diagnosed with pancreatic cancer between 2006 and 2010, by sex, deprivation and period of follow-up, England**

Socioeconomic deprivation	0-1 month				1 month-1-year				1 year and over			
	Male		Female		Male		Female		Male		Female	
	Relative survival	95% CI										
1 (least deprived)	74.7	(73.2-76.2)	76.3	(74.7-77.8)	28.3	(26.5-30.1)	26.6	(24.8-28.5)	28.8	(24.8-33.0)	25.2	(21.2-29.4)
2	73.3	(71.8-74.8)	74.0	(72.5-75.4)	27.0	(25.3-28.8)	24.9	(23.2-26.6)	27.0	(23.0-31.1)	25.8	(21.9-30.0)
3	72.8	(71.3-74.3)	72.8	(71.3-74.3)	26.6	(24.9-28.4)	24.2	(22.5-25.8)	25.0	(21.1-29.1)	24.0	(20.1-28.1)
4	68.6	(66.9-70.2)	73.7	(72.2-75.2)	23.9	(22.1-25.8)	23.6	(21.9-25.3)	28.2	(23.4-33.2)	29.4	(24.9-34.1)
5 (most deprived)	69.1	(67.3-70.8)	70.6	(68.9-72.3)	23.7	(21.7-25.7)	23.4	(21.6-25.4)	31.2	(25.8-36.8)	28.5	(23.5-33.6)

**Figure 8.2. Relative survival (%) for pancreatic cancer patients diagnosed between 2006 and 2010, by sex, deprivation and period of follow-up, England**



- in males and females, relative survival was lower in more deprived than less deprived areas in the short- and intermediate-term
- survival in the long-term period was higher in the more deprived than less deprived areas for both males and females although these differences were not significant

## References

1. Coupland VH, Allum W, Blazeby JM, Mendall MA, Hardwick RH, Linklater KM, Møller H, Davies EA. Incidence and survival of oesophageal and gastric cancer in England between 1998 and 2007, a population-based study. *BMC Cancer* 2012;**12**:11.
2. Coupland VH, Kocher HM, Berry DP, Allum W, Linklater KM, Konfortion J, Møller H, Davies EA. Incidence and survival for hepatic, pancreatic and biliary cancers in England between 1998 and 2007. *Cancer epidemiology* 2012;**36**:e207-14.
3. Møller H, Sandin F, Robinson D, Bray F, Klint S, Linklater KM, Lambert PC, Pahlman L, Holmberg L, Morris E. Colorectal cancer survival in socioeconomic groups in England: variation is mainly in the short term after diagnosis. *Eur J Cancer* 2012;**48**:46-53.
4. Office of the Deputy Prime Minister. *The English Indices of Deprivation 2007*, vol. 2015: Directgov, 2007.
5. Office of the Deputy Prime Minister. *The English Indices of Deprivation 2010*, vol. 2015 GOV.UK, 2010.
6. Paul W. Dickman EC. *Estimating and modelling relative survival* The Stata Journal, ed. 2014: StataCorp LP, 2014:1-29.