

# Comprehensive Analysis of National Health Insurance Database for Breast Cancer Survivorship



National Health Insurance Service Ilsan Hospital  
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Ho Hur

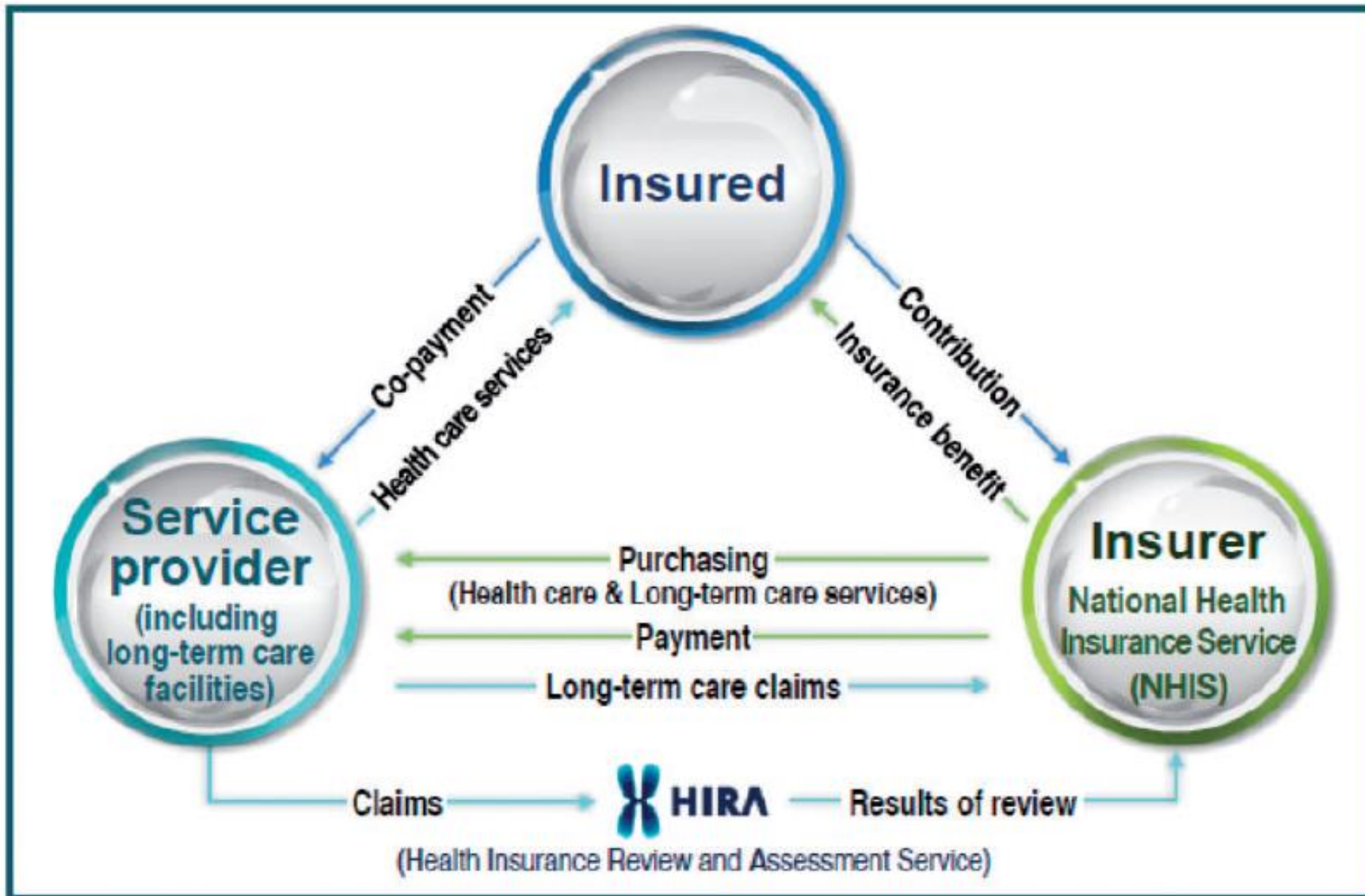
- What is National Health Insurance Database (NHID)?
- Researches using NHID on breast cancer survivorship
- Weaknesses of NHID

What is NHID(National Health Insurance Database)?

# What is NHID?

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- NHID is a public database on health care utilization, health screening for the whole population of Korea
- NHID is formed by the National Health Insurance Service(NHIS).



To govern and carry out these processes, the NHIS built a data warehouse to collect the required information on insurance eligibility, insurance contributions, medical history and medical institutions.

# What is NHID?

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- Research using NHI claim data started in 1986.
- Since then, the need to provide NHI data for research purposes has increased.
- In 2012 the NHIS formed the NHID, using information from an existing database system.

# What is NHID? – included DB(Database)

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- Eligibility DB
- Healthcare utilization DB
- National Health screening DB
- Long-term care insurance DB
- Healthcare provider DB

**Table 3.** Component databases (DB) and associated variables of the National Health Information Database of the National Health Insurance Service in South Korea

Component database	Domains	Variables	Year
<b>Eligibility DB</b>			
Sociodemographics	sex, age, residential area, insurance type, monthly contribution, occupation		
Vital statistics	Dates of birth and death		
Transitional age health screening	Health examination	Hepatitis B antigen/antibody, bone density test, mental health screening (cognitive ability/depression), neurological examination for lower leg	2007-14
National cancer screening	Questionnaires	Weight loss, family history, past medical history, menarche and menopausal age, fertility history, duration of lactation, history of oral contraceptive use	2002-14
<b>Healthcare utilization DB</b>			
Diagnosis	diagnosis(ICD-10 codes)		
Utilization and cost	dates of visit, types of medical institutions, type of visit(inpatient/outpatient/emergency/ICU), length of stay, medical cost		
Health care procedures	operation and procedure codes, medication history (generic name code, dose, duration of prescription), material codes		
	care providers	sources, specialties of physicians	



Table 3. Component databases (DB) and associated variables of the National Health Information Database of the National Health Insurance Service in South Korea

Component database Domains Variables Year

## National health screening DB

### General health screening

health behaviors      smoking, alcohol drinking, physical activity, past medical history, family history

Physical examinations      Height, weight, waist circumference, body mass index, blood pressure .....

Laboratory tests      Hemoglobin, fasting glucose, total cholesterol, HDL .....

### National cancer screening

Questionnaires      Weight loss, family history, past history, menarche and menopausal age, fertility history, duration of lactation, history of oral contraceptive use

Invasive tests      Mammography, gastroscopy, colonoscopy, pap smear .....

care providers

sources, specialties of physicians

**Table 1.** Component databases (DB) and their numbers of subjects from the National Health Information Database of the National Health Insurance Service in South Korea

Year	Eligibility DB <sup>a</sup>		National health screening DB	Health care utilization DB	Long-term care insurance DB	Healthcare provider DB
	Total no. of subjects	Total no. of deaths	Total no. of participants	Total no. of subjects	Total no. of subjects	Total no. of healthcare providers
2002	48080015	243087	5525302	41487835		71359
2003	48556572	242399	5667566	41390631		74086
2004	48900835	240083	7002782	42198744		75988
2005	49153617	240122	6771929	43838124		78357
2006	49238227	239383	8929979	44821945		80910
2007	49672388	241066	9023096	45162120		82753
2008	50001057	238518	11854942	45605858		84116
2009	50290771	238528	12046321	46427662	419155	84947
2010	50581191	249021	13423674	46759415	439616	86694
2011	50908646	250387	14268872	47092462	388693	88159
2012	51169141	258983	15610300	47524654	389628	89399
2013	51448491	253552	16267134	48065748	423622	90330
2014	51757146	232066	17379951	48309955	442103	91353

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Cohort Profile

# **Cohort Profile: The National Health Insurance Service–National Sample Cohort (NHIS-NSC), South Korea**

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**Table 1.** Number of participants in each cohort year and number of infants added annually (unit: person)

Year	Number of participants in cohort (A)	Number of infants aged 0 in the cohort	Number of participants who took the health examination (B)	Percentage of subjects who took the health examination (B/A)
2002	1025340	9565	113641	11%
2003	1017468	9437	118758	12%
2004	1016580	9320	142281	14%
2005	1016820	8557	135475	13%
2006	1002005	7872	174625	17%
2007	1020743	9766	162829	16%
2008	1000785	9393	210960	21%
2009	998527	8616	211541	21%
2010	1002031	9032	228746	23%
2011	1006481	9694	235336	23%
2012	1011123	9851	241397	24%
2013	1014730	8825	234478	23%

# Details of DB and cost

Home > Sample Research DB > Details of DB and cost > Sample cohort DB

Provision guide

Details of DB and cost

Sample cohort DB

Medical check-up cohort DB

Elderly cohort DB

Working women cohort DB

Infant medical check-up cohort DB

## Details

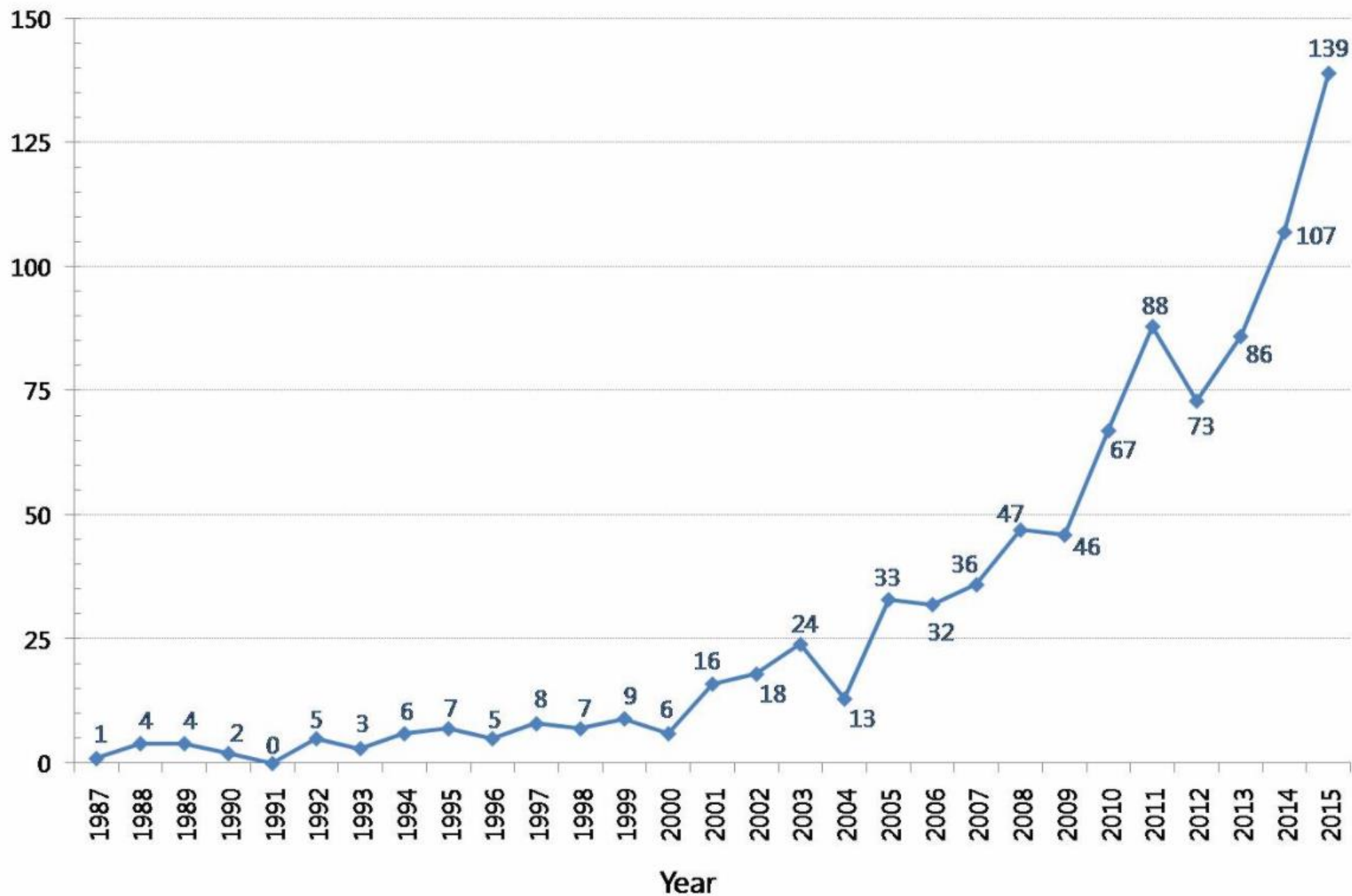
- **[Standard]** Qualified individuals as of 2002 (Approximately a million)
- **[Duration]** 2002-2013 (12 years)
- **[Contents]** Social & economic qualification variables (including death and disability), status of medical resource utilization (Consult and medical check-up), and status of clinic
- **[Reference]** Download reference data of Sample cohort [↓](#)

### • Qualification DB



- **Subjects** Health insurance subscribers and Medicare recipients (excluding foreigners)
- **Variables** composed of total 14 variables including gender, age, location, type of subscription, social economic variable of the subject such as income rank, disability, death, and etc.
- **Additional data (2 types)** Cause of death (medium division, subclass) from the National statistics office, state and local data → [Download reference data](#)

## No. of publications



# Researches with NHID on Breast Cancer Survivorship

# MOU

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- The Korean Breast Cancer Society and NHIS have signed an MOU for research on breast cancer using NHID.
- We are currently working on four studies and the titles are as follows.
  - Late effects of treatment in breast cancer survivors
  - Depressive symptom and depression in Korean patients with breast cancer
  - Pregnancy and childbirth issues in breast cancer survivors
  - The influence of metabolic syndrome on the incidence and prognosis of breast cancer

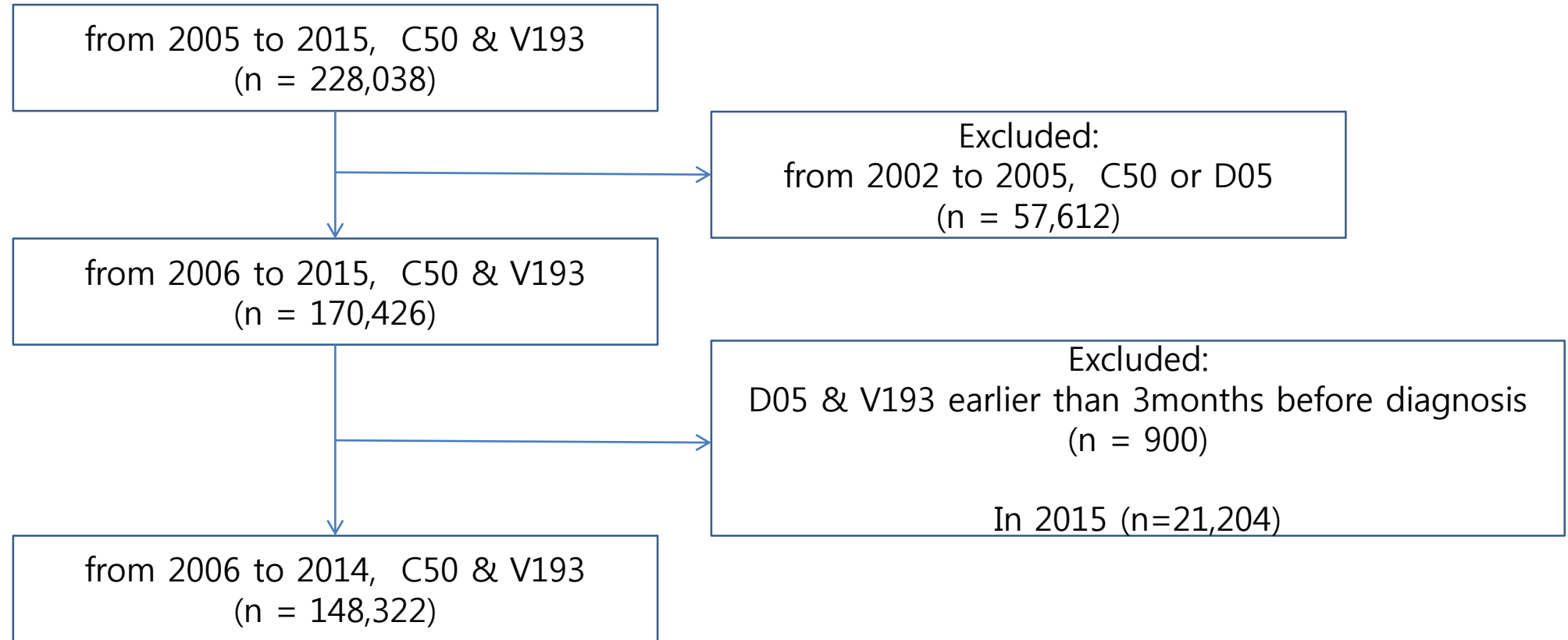


# Changing patterns in incidence and treatment of breast cancer

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- Operational Definition of invasive breast cancer
  - ICD-10 C50 and V193
- V193 code: special case registration for cancer
  - In September 2005 NHIS created a new registration system for severe illnesses such as cancer to cover 90% of financial burden of health care.
- NHID is a very good source for a cancer-related epidemiological study

# Changing patterns in incidence and treatment of breast cancer



# Changing patterns in incidence and treatment of breast cancer

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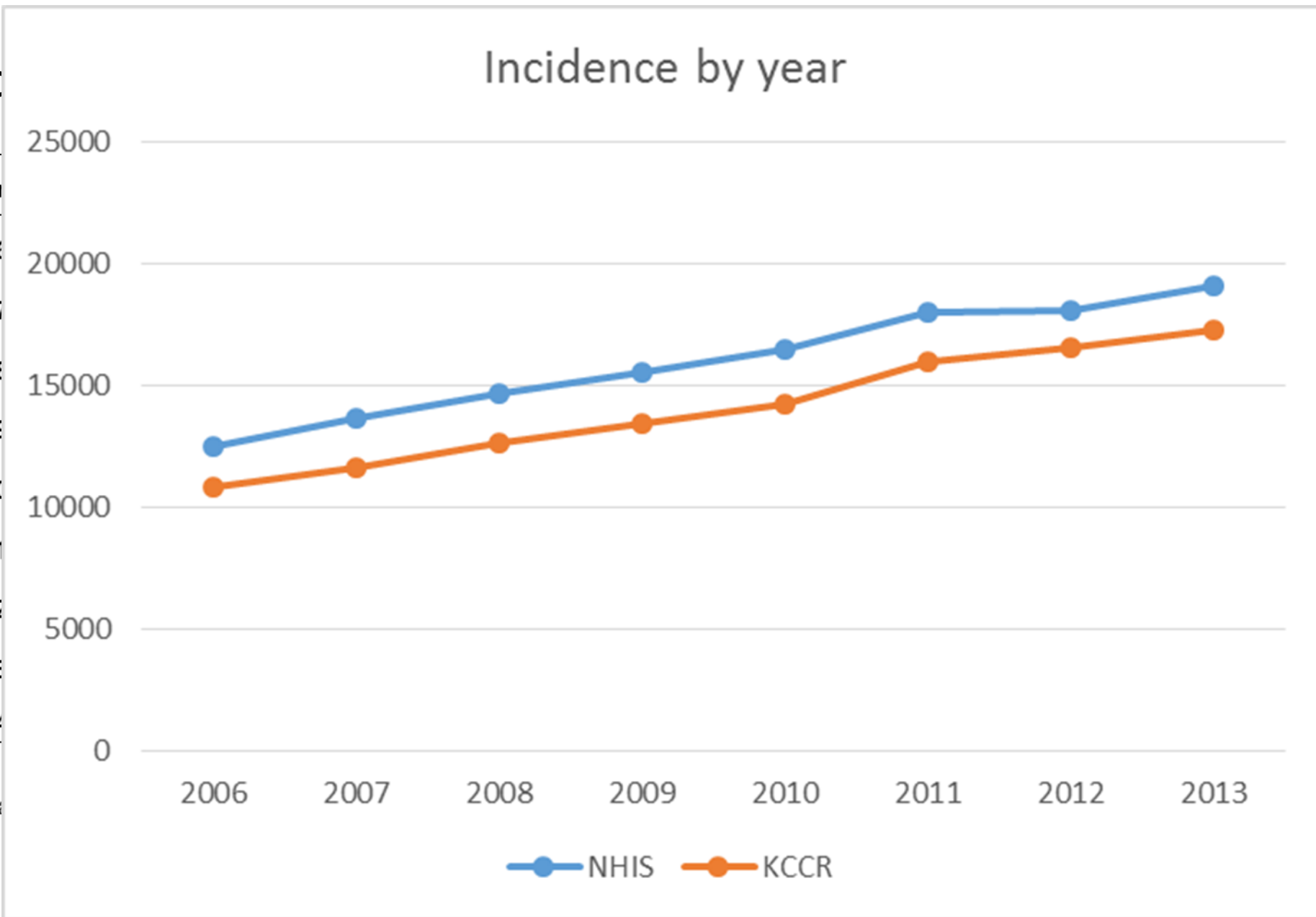
- Definition of patients who had surgical treatment
  - patients had breast cancer operation code within a year after diagnosis of breast cancer
  - patients had benign breast diseases operation code within 3 months before diagnosis of breast cancer

# Changing patterns in incidence and treatment of breast cancer

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- Definition of patients who had chemotherapy
  - Patient who had a chemotherapy prescription code within one year after diagnosis of breast cancer
- Definition of patients who had endocrine therapy
  - within one year after diagnosis of breast cancer
- Definition of patients who had radiotherapy
  - within one year after diagnosis of breast cancer
- Definition of patients who had Herceptin treatment
  - within one year after diagnosis of breast cancer

Surgery	N7131%, N7132%, N7133%, N7135%, P2122%, P2123%, P2124%, N7121%*, N7122%*
<u>Chemotherapy</u>	cyclophosphamide (139004BIJ, 139005BIJ, 139001ATB),doxorubicin (149401BIJ, 149402BIJ, 149403BIJ, 149404BIJ, 149405BIJ, 149406BIJ),epirubicin (152701BIJ, 152702BIJ, 152703BIJ, 152704BIJ),fluorouracil (161401BIJ, 161402BIJ, 161404BIJ), methotrexate (192102BIJ, 192103BIJ, 192104BIJ, 192105BIJ), paclitaxel (207801BIJ, 207802BIJ, 207803BIJ, 207804BIJ, 207805BIJ, 207806BIJ), docetaxel (148301BIJ, 148302BIJ, 148304BIJ, 148305BIJ, 148306BIJ), cisplatin (134501BIJ, 134502BIJ, 134503BIJ), carboplatin (123701BIJ, 123702BIJ, 123703BIJ, 123704BIJ, 123706BIJ, 123707BIJ, 123708BIJ), vinorelbine (248201BIJ, 248202BIJ), capecitabine (122701ATB, 122702ATB), gemcitabine (164901BIJ, 164902BIJ, 164903BIJ), albumin-bound paclitaxel (503701BIJ), <u>eribulin</u> (621301BIJ)
Endocrine therapy	Tamoxifen (234501ATB, 234502ATB), Toremifene (242101ATB), Anastrozole (109001ATB), <u>Letrozole</u> (182201ATB), <u>Exemestane</u> (358401ATB), Leuprolide (182602BIJ, 182604BIJ), <u>Goserelin</u> (167201BIJ, 167202BIJ)
Radiation therapy	HD05%, HD06%, HD08%, HD09%
Targeted therapy	Trastuzumab (242801BIJ, 242802BIJ, 242803BIJ)



Year

2006

2007

2008

2009

2010

2011

2012

2013

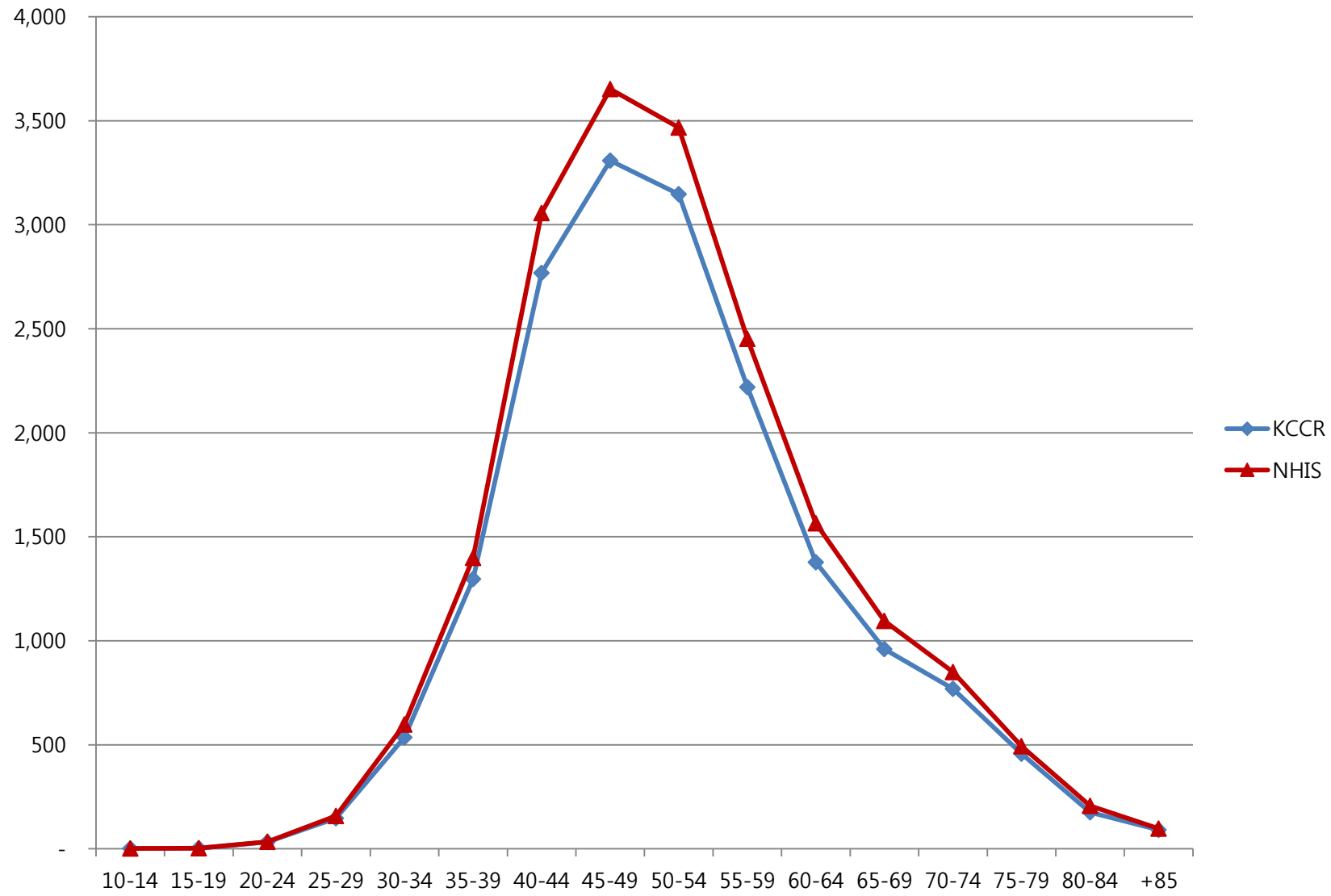
2014

NHIS=National Health Insurance

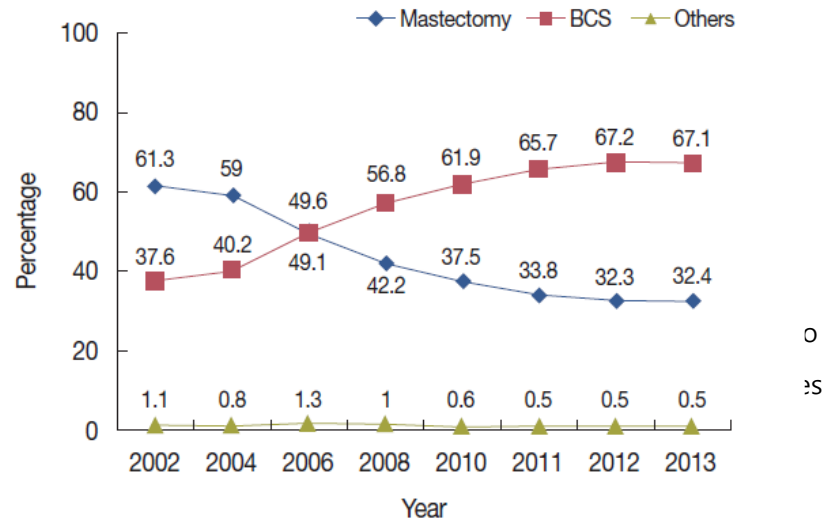
NA, not available.

—●— NHIS —●— KCCR

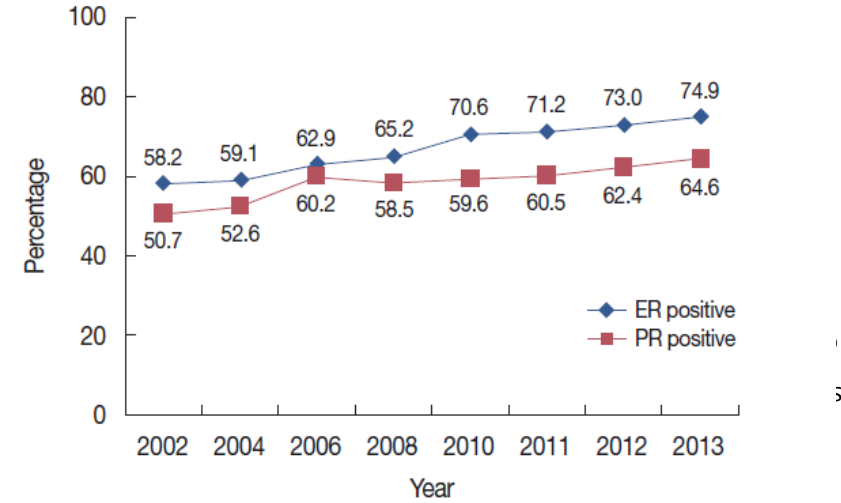
Age distribution patterns of Korean breast cancer between National Health Insurance Service and Korea Central Cancer Registry Data in 2013.



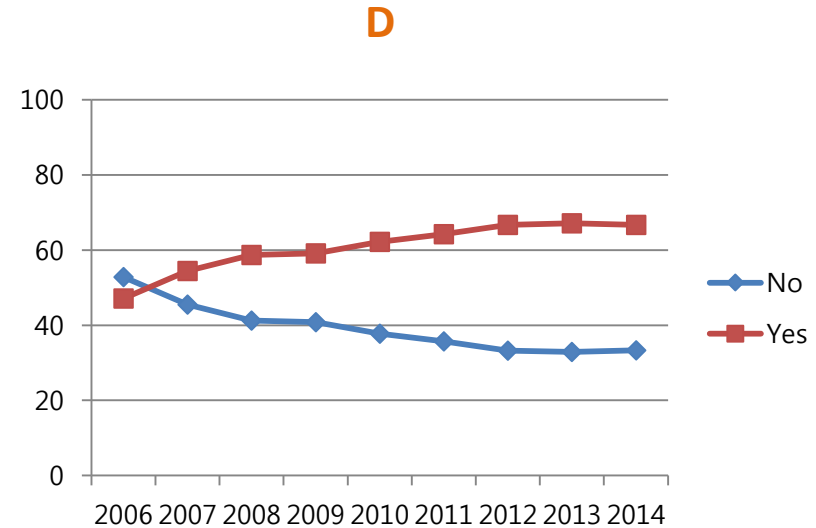
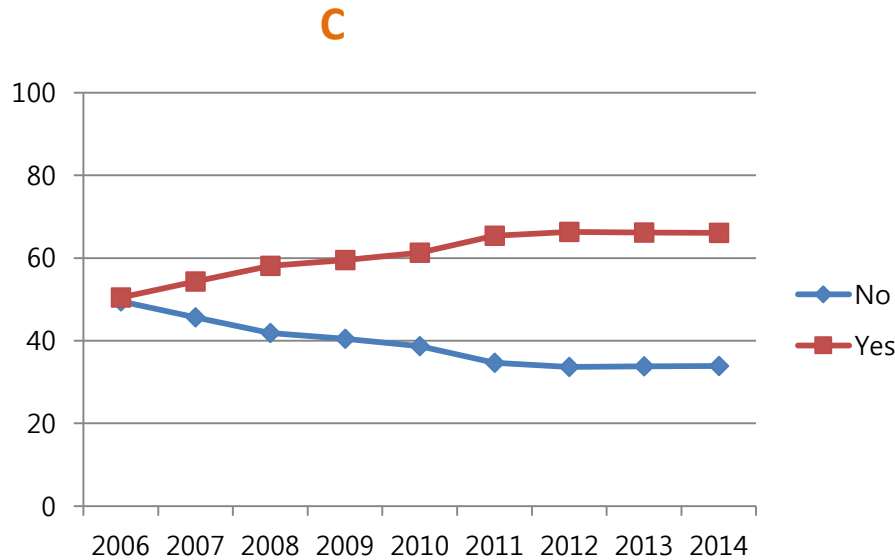
Choice of adjuvant treatment in incident cases of breast cancer. Proportions of treatment modality within one year after diagnosis were presented as follows; (A) surgerv. (B) chemotherapy. (C). radiotherapy, and (D) endocrine therapy.



**Figure 6.** Changes in the surgical management of breast cancer. BCS=breast-conserving surgery.

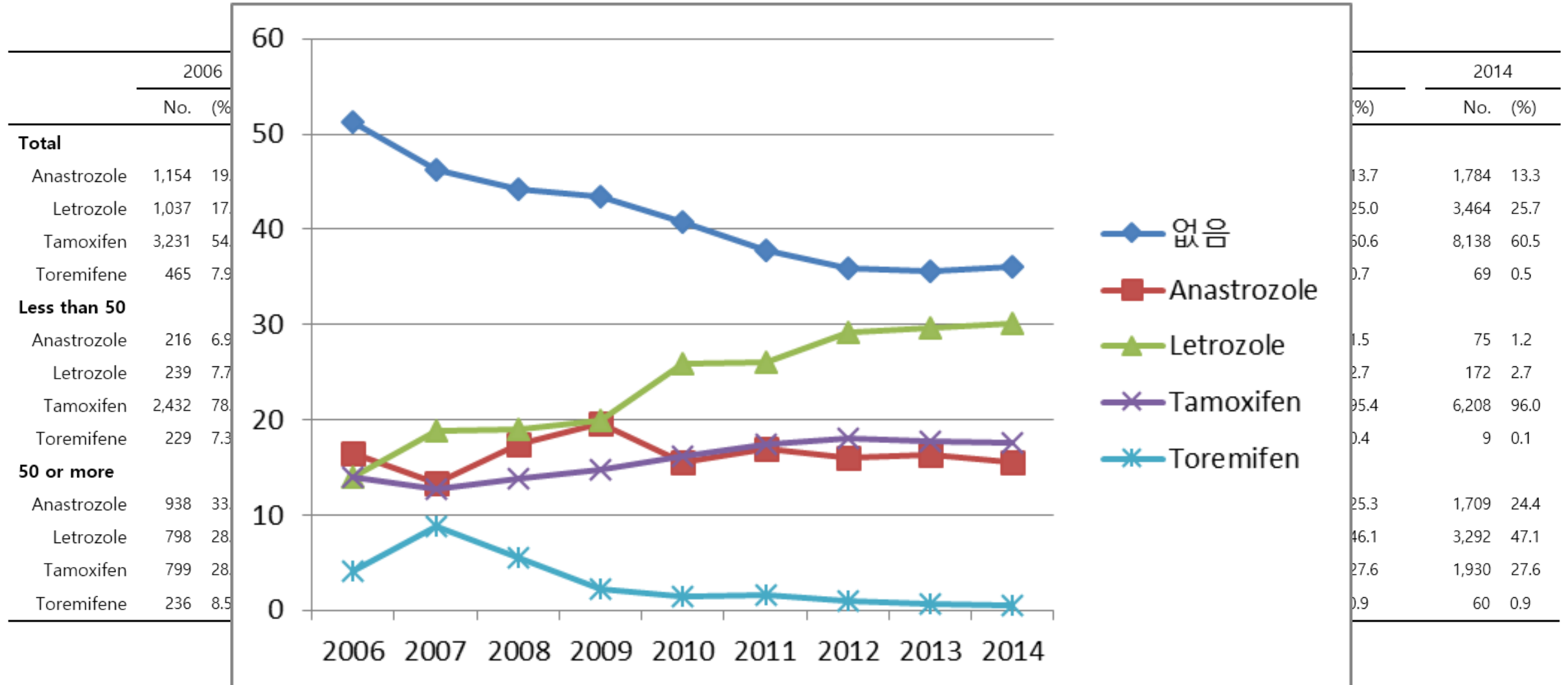


**Figure 4.** Changing trends in the hormone receptor-positive breast cancer. ER=estrogen receptor; PR=progesterone receptor.





## Trends in anti-hormonal therapy for breast cancer treatment in Korea



# MOU

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- Late effects of treatment in breast cancer survivors
  - Prof. Il Yong Chung, Prof. Jihyoun Lee
- Depressive symptom and depression in Korean patients with breast cancer
  - Prof. Yoo Seok Kim, Prof. Eun Jung Sim
- pregnancy and childbirth issues in breast cancer survivors
  - Prof. Ilkyun Lee, Prof. Hak Min Lee
- The influence of metabolic syndrome on the occurrence of breast cancer
  - Prof. KT Hwang

# Late effects of treatment in breast cancer survivors

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- Researcher
  - Prof. Il Yong Chung
  - Prof. Jihyoun Lee

## The comparison of cardiac events between breast cancer survivors and general population

		HR(95% CI)					
	Breast cancer	N	EVENT	DURATION	IR(per 1000)	MODEL1	MODEL2
MI	No	560290	3526	2906903	1.21297	1(REF.)	1(REF.)
	Yes	112058	867	552203	1.57007	1.326(1.231,1.428)	1.258(1.168,1.355)
CHF	No	560290	4197	2907932	1.44329	1(REF.)	1(REF.)
	Yes	112058	1509	551758.5	2.73489	1.973(1.86,2.092)	1.86(1.753,1.973)
Death	No	560290	9129	2916459	3.1302	1(REF.)	1(REF.)
	Yes	112058	10135	554801.2	18.2678	5.976(5.809,6.147)	6.019(5.851,6.193)

MI and CHF were more common in women with breast cancer than in general women.

# Depression and anxiety disorder in Korean breast cancer patients

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- Researchers
  - Prof. Yoo Seok Kim
  - Prof. Eun Jung Sim

# Depression and anxiety disorder in Korean breast cancer patients

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- Disease code
  - Depression: F32, 33, 34, 38, 39
  - Anxiety disorder: F40-F42
- Definition of disease
  - Patients who had disease code for depression and/or anxiety disorder within a year after diagnosis of breast cancer
  - Patients who did not have disease code for depression and/or anxiety disorder earlier than a year before diagnosis of breast cancer

# Depression and anxiety disorder in Korean breast cancer patients

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- The aim of this study is to investigate the effect of depression and/or anxiety disorder on mortality rate of breast cancer patients

## Patients characteristics

N	NON 99794	Depression only 7868	Anxiety disorder only 13525	BOTH 3194
<b>SEX</b>				
Male	896(0.9)	61(0.78)	97(0.72)	16(0.5)
Female	98898(99.1)	7807(99.22)	13428(99.28)	3178(99.5)
<b>AGE_GR(50)</b>				
AGE < 50	54971(55.08)	4163(52.91)	7236(53.5)	1664(52.1)
AGE ≥ 50	44823(44.92)	3705(47.09)	6289(46.5)	1530(47.9)
<b>PLACE (2)</b>				
Seoul	25267(25.32)	1414(17.97)	3069(22.69)	590(18.47)
metropolitan	25445(25.5)	2789(35.45)	3455(25.55)	952(29.81)
the others	49082(49.18)	3665(46.58)	7001(51.76)	1652(51.72)
<b>INCOME_GR</b>				
medical aid	2705(2.71)	276(3.51)	406(3)	106(3.32)
Q1	25074(25.13)	2044(25.98)	3376(24.96)	855(26.77)
Q2	21158(21.2)	1736(22.06)	2820(20.85)	704(22.04)
Q3	22475(22.52)	1711(21.75)	3119(23.06)	691(21.63)
Q4	28382(28.44)	2101(26.7)	3804(28.13)	838(26.24)
<b>CCI_GR</b>				
No	3908(3.92)	131(1.66)	171(1.26)	35(1.1)
1	2302(2.31)	98(1.25)	142(1.05)	33(1.03)
≥ 2	93584(93.78)	7639(97.09)	13212(97.69)	3126(97.87)
<b>Type</b>				
C50	91498(91.69)	7505(95.39)	13022(96.28)	3074(96.24)
D05	8296(8.31)	363(4.61)	503(3.72)	120(3.76)
<b>Disabled</b>				
No	95077(95.27)	7407(94.14)	12860(95.08)	3007(94.15)
Yes	4717(4.73)	461(5.86)	665(4.92)	187(5.85)
<b>Chemotherapy</b>				
0	44055(44.15)	2552(32.44)	3095(22.88)	833(26.08)
1	55739(55.85)	5316(67.56)	10430(77.12)	2361(73.92)
<b>Radiation therapy</b>				
0	37094(37.17)	2796(35.54)	4350(32.16)	997(31.21)
1	62700(62.83)	5072(64.46)	9175(67.84)	2197(68.79)
<b>Endocrine therapy</b>				
0	33249(33.32)	2637(33.52)	4971(36.75)	1122(35.13)
1	66545(66.68)	5231(66.48)	8554(63.25)	2072(64.87)
<b>Target therapy</b>				
0	90269(90.46)	6930(88.08)	11474(84.84)	2708(84.78)
1	9525(9.54)	938(11.92)	2051(15.16)	486(15.22)
<b>AGE</b>	49.81±11.18	50.41±10.7	49.78±10.79	50.05±10.57
<b>DURATION</b>	4.46±2.33	4.38±2.38	4.15±2.31	3.98±2.28

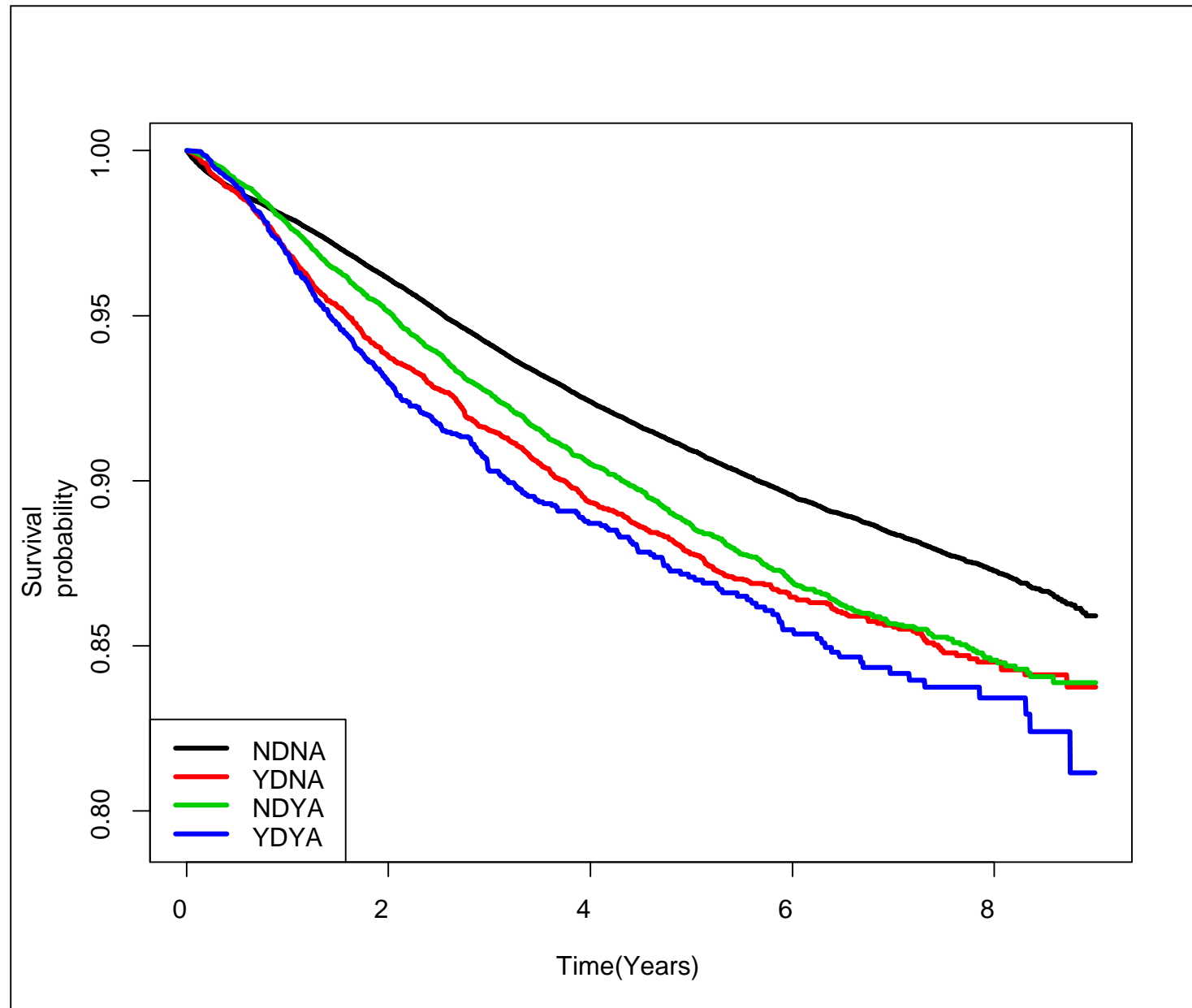
**Depression only: 6.3%**

**Anxiety disorder only: 10.9%**

**Both: 2.6%**



# Survival curve according to presence of disease (depression and/or anxiety disorder)



## Effect of depression and/or anxiety disorder on mortality rate

Type	N	Event	Duration	MR(per 1000)	HR(95% CI)	
					MODEL1	MODEL2
<b>NON</b>	99794	8225	445322.36	18.4698	1(ref.)	1(ref.)
<b>Depression only</b>	7868	859	34489.41	24.9062	1.349(1.257-1.447)	1.264(1.178-1.357)
<b>Anxiety disorder only</b>	13525	1302	56178.13	23.1763	1.253(1.182-1.328)	1.147(1.081-1.216)
<b>BOTH</b>	3194	356	12705.97	28.0183	1.518(1.366-1.689)	1.383(1.243-1.538)

**MODEL1**                    adjusted for age, sex

**MODEL2**                    adjusted for age, sex, Place, Income, CCI, disabled, yb\_type(C50, D05), Chemotherapy,

Radiation therapy, Endocrine therapy, Target therapy

## Effect of medication for depression on mortality of breast cancer with depression

Type	N	Event	Duration	MR(per 1000)	HR(95% CI)	
					MODEL1	MODEL2
<b>No depression</b>	113319	9527	501500.49	18.997	1(ref.)	1(ref.)
<b>Depression without medication</b>	358	60	1357.36	44.2035	2.096(1.626-2.701)	2.181(1.692-2.811)
<b>Depression with medication</b>	10704	1155	45838.01	25.1974	1.332(1.253-1.415)	1.246(1.171-1.324)

**MODEL1** adjusted for age, sex

**MODEL2** adjusted for age, sex, Place, Income, CCI, disabled, yb\_type(C50, D05), Chemotherapy,  
Radiation therapy, Endocrine therapy, Target therapy

# Pregnancy and childbirth issues in breast cancer survivors

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- Researcher
  - Prof. Ilkyun Lee
  - Prof. Hak Min Lee
- This study aimed to analyze the current status of pregnancy and childbirth in young women who were diagnosed with breast cancer and analyze their effects on breast cancer treatment.

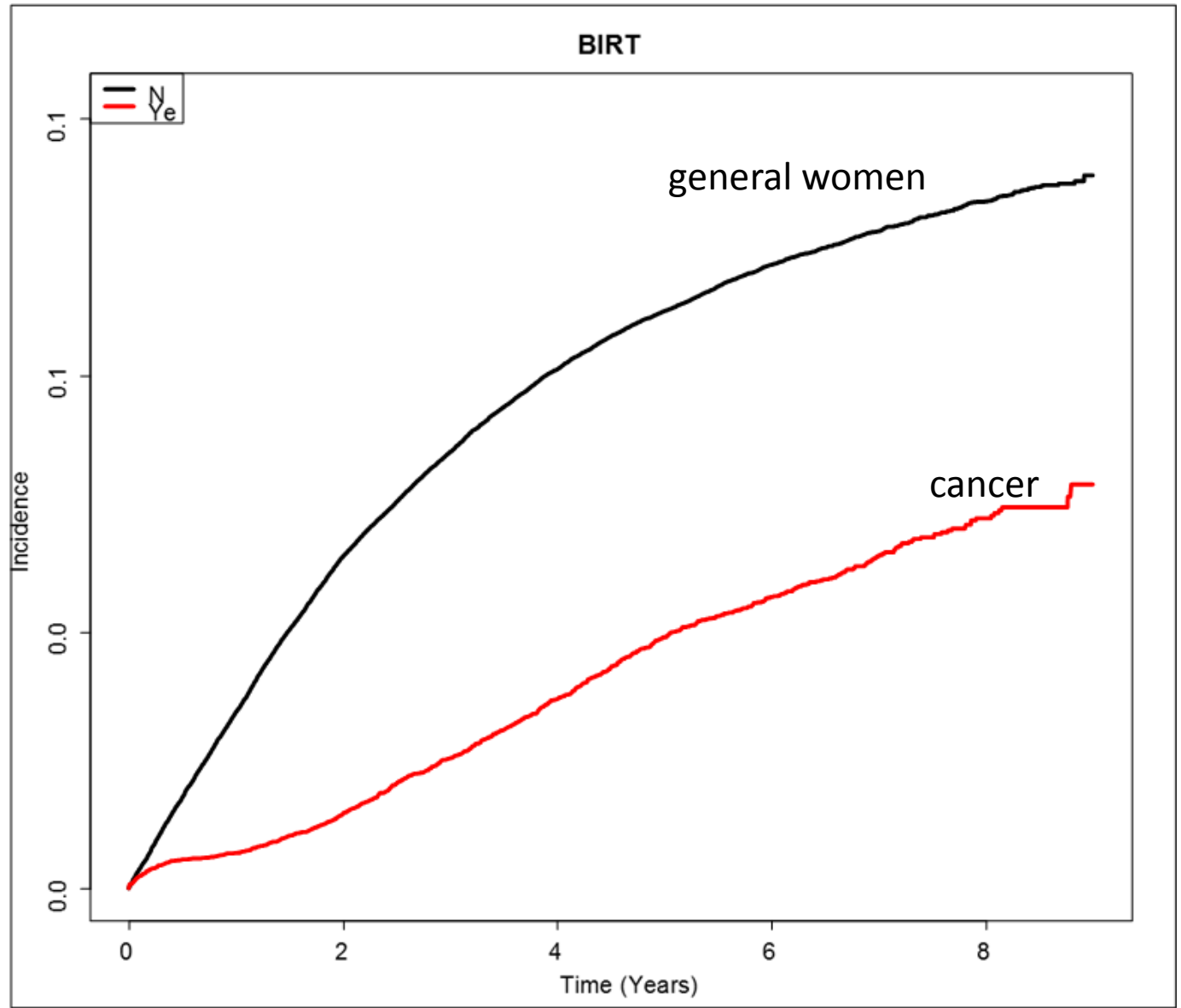
# Pregnancy and childbirth issues in breast cancer survivors

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- Disease code
  - Full term delivery: O80%, O81%, O840, O841
  - Preterm delivery: O601%, O603%
  - PROM: O42%
  - Preterm labour: O600%, O601%, O602%
  - Miscarriage: N96, O001, O021, O03%, O04%, O05%, O06%, O07%, O08%, O200, O262, O311, R4441, R4442, R4452, R4453, R4456, R4457, R4458, R4459
  - Preeclamsia: O11, O140, O141, O149
  - Hydramnios/Oligo-: O40/O41
  - Polycyesis: O30%, O84%, O311, Z372%, Z373%, Z374%, Z375%, Z376%, Z377%
  - Obstetric hemorrhage: O031, O036, O041, O046, O051, O056, O061, O066, O678, O679, O720, O721, O722, O902

## Patients characteristics

	General women (n=91400)	Cancer (n=18280)	p-value
<b>AGE</b>	34.94±3.81	34.94±3.81	1
<b>AGE_GR</b>			1
20-29	33525(36.68)	6705(36.68)	
30-39	57875(63.32)	11575(63.32)	
<b>PLACE</b>			0.0012
Urban	43359(47.44)	8912(48.75)	
Rural	48041(52.56)	9368(51.25)	
<b>INCOME</b>			<.0001
Upper 80%	70435(77.06)	14546(79.57)	
Lower 20%	20965(22.94)	3734(20.43)	
<b>DM</b>			<.0001
No	90800(99.34)	18108(99.06)	
Yes	600(0.66)	172(0.94)	
<b>Hypertension</b>			<.0001
No	90048(98.52)	17844(97.61)	
Yes	1352(1.48)	436(2.39)	
<b>Dyslipidemia</b>			<.0001
No	90490(99)	17960(98.25)	
Yes	910(1)	320(1.75)	
<b>Delivery</b>			<.0001
No	81236(88.88)	17425(95.32)	
Yes	10164(11.12)	855(4.68)	
<b>F/U year</b>			1
2007	12080(13.22)	2416(13.22)	
2008	12470(13.64)	2494(13.64)	
2009	12825(14.03)	2565(14.03)	
2010	13350(14.61)	2670(14.61)	
2011	13930(15.24)	2786(15.24)	
2012	13140(14.38)	2628(14.38)	
2013	13605(14.89)	2721(14.89)	
<b>F/U DURATION</b>	5±2.24	4.99±2.14	0.8536



**Delivery rate of breast cancer women was lower than that of general women**

## Comparison of delivery between women with breast cancer and women without breast cancer

					HR(95% CI)	
	N	Event	Duration	IR (per 1000)	MODEL1	MODEL2
<b>General women</b>	91400	10164	456765.65	22.2521	1 (ref.)	1 (ref.)
<b>Cancer</b>	18280	855	91292.44	9.3655	0.41(0.383,0.44)	0.412(0.384,0.442)

Model 1 adjusted for age, income

Model 2 adjusted for age, income, place, DM, HTN, Dyslipidemia



## Effect of treatment for breast cancer on delivery

	N	Event	Duration	IR(per 1000)	HR(95% CI)	
					MODEL1	MODEL2
<b>Radiation</b>						
No	6030	306	30235.07	10.1207	1 (ref.)	1 (ref.)
Yes	12250	549	61057.38	8.9915	0.896(0.779,1.031)	0.893(0.776,1.027)
<b>Chemotherapy</b>						
No	6102	400	30396.48	13.1594	1 (ref.)	1 (ref.)
Yes	12178	455	60895.96	7.4718	0.61(0.532,0.698)	0.608(0.531,0.696)
<b>Endocrine Tx</b>						
No	6817	527	32535.86	16.1975	1 (ref.)	1 (ref.)
Yes	11463	328	58756.58	5.5824	0.44(0.383,0.506)	0.44(0.383,0.506)
<b>Target therapy</b>						
No	16568	815	84482.63	9.64695	1 (ref.)	1 (ref.)
Yes	1712	40	6809.81	5.87388	0.62(0.451,0.852)	0.624(0.454,0.858)

Model 1      adjusted for age, income

Model 2      adjusted for age, income, place, DM, HTN, Dyslipidemia

# Adherence to endocrine therapy in Korean breast cancer patients

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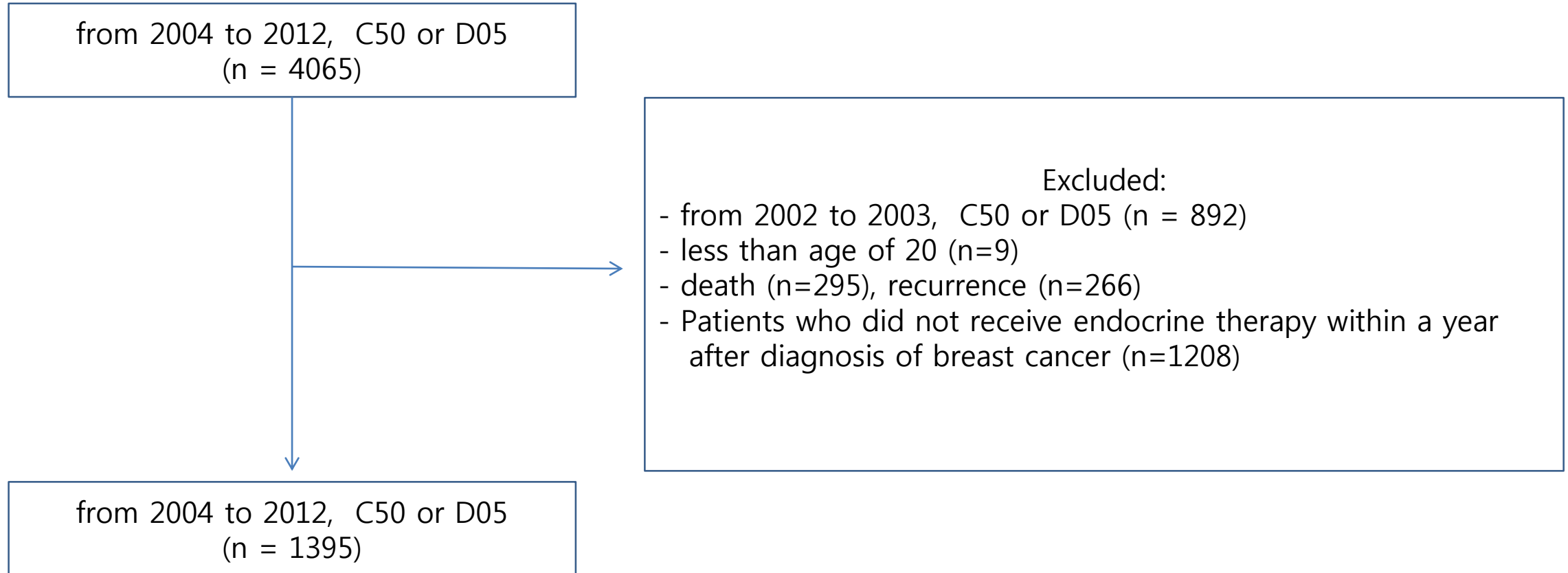
- Adherence:  $\geq 80\%$  of MPR
- Non adherence:  $< 80\%$  of MPR
- MPR (medication possession ratio)
  - total days covered by medication / the days needing medication

# Adherence to endocrine therapy in Korean breast cancer patients

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- Study population
  - Breast cancer patients who received endocrine therapy within a year after diagnosis of breast cancer from 2004 to 2012.
- Definition of recurrence
  - Patients having C780~C788
  - or C770~C779 after a year from diagnosis of breast cancer

# Adherence to endocrine therapy in Korean breast cancer patients



## Patient characteristics

Characteristics	No	%
Type of endocrine therapy		
Tamoxifen	792	56.77
Toremifen	77	5.52
Aromatase inhibitor	383	27.46
Switch	143	10.25
Age at diagnosis		
< 50	731	52.40
50 - 65	509	36.49
>= 65	155	11.11
Sex		
Female	1387	99.43
Male	8	0.57
Economic status		
0	67	4.80
1	53	3.80
2	81	5.81
3	92	6.59
4	123	8.82
5	186	13.33
6	100	7.17
7	102	7.31
8	115	8.24
9	156	11.18
10	320	22.94
Year at diagnosis		
2004	84	6.02
2005	98	7.03
2006	122	8.75
2007	134	9.61
2008	159	11.40
2009	166	11.90
2010	201	14.41
2011	225	16.13
2012	206	14.77
Stage at diagnosis		
Invasive	1166	83.58
In situ	229	16.42
Operation		
No	171	12.26
Yes	1224	87.74
Chemotherapy		
No	641	45.95
Yes	754	54.05
Charlson comorbidity index		
0	199	14.27
1	70	5.02

## Adherence to endocrine therapy

Duration of therapy	Adherence
Year 1	80.65%
Year 2	71.66%
Year 3	64.94%
Year 4	54.13%
Year 5	44.22%

**Risk factors for nonadherence to endocrine therapy**

Characteristics	Adherent (n=264) No. (%)	Nonadherent (n=302) No. (%)	HR (95% CI) multivariate
Type of endocrine therapy			
Tamoxifen	112 (42.42)	168 (55.63)	ref
Toremifen	19 (7.20)	38 (12.58)	1.401 (0.961-2.043)
AI	80 (30.30)	45 (14.90)	0.676 (0.454-1.006)
Switch	53 (20.08)	51 (16.89)	0.736 (0.527-1.027)
Age at diagnosis			
< 50	128 (48.48)	197 (65.23)	1.707 (1.065-2.304)
50 - 65	119 (45.08)	81 (26.82)	ref
>= 65	17 (6.44)	24 (7.95)	1.780 (1.084-2.922)
Economic status			
1	8 (3.03)	14 (4.64)	ref
2	15 (5.68)	26 (8.61)	0.844 (0.434-1.639)
3	22 (8.33)	33 (10.93)	0.622 (0.312-1.233)
4	20 (7.58)	32 (10.60)	0.622 (0.312-1.233)
5	15 (5.68)	26 (8.61)	0.622 (0.312-1.233)
6	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
7	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
8	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
9	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
10	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
11	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
12	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
13	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
14	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
15	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
16	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
17	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
18	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
19	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
20	10 (3.79)	16 (5.30)	0.622 (0.312-1.233)
2005	37 (14.02)	58 (19.21)	0.658 (0.329-1.318)
2006	49 (18.56)	68 (22.52)	0.696 (0.358-1.354)
2007	69 (26.14)	63 (20.86)	0.499 (0.254-0.980)
2008	79 (29.92)	62 (20.53)	0.430 (0.219-0.842)
Stage at diagnosis			
Invasive	236 (89.39)	253 (83.77)	ref
In situ	28 (10.61)	49 (16.23)	1.521 (0.844-2.742)
Operation			
No	20 (7.58)	33 (10.93)	ref
Yes	244 (92.42)	269 (89.07)	0.751 (0.515-1.094)
Chemotherapy			
No	84 (31.82)	138 (45.70)	ref
Yes	180 (68.18)	164 (54.30)	0.710 (0.545-0.925)
Charlson comorbidity index			
0	44 (16.67)	70 (23.18)	ref
1	9 (3.41)	16 (5.30)	1.012 (0.576-1.777)
>=2	211 (79.92)	216 (71.52)	1.320 (0.693-2.515)

- **<50, ≥65 are risk factors for nonadherence.**
- **Patients who received chemotherapy showed good adherence**
- **Economic status did not affect adherence**

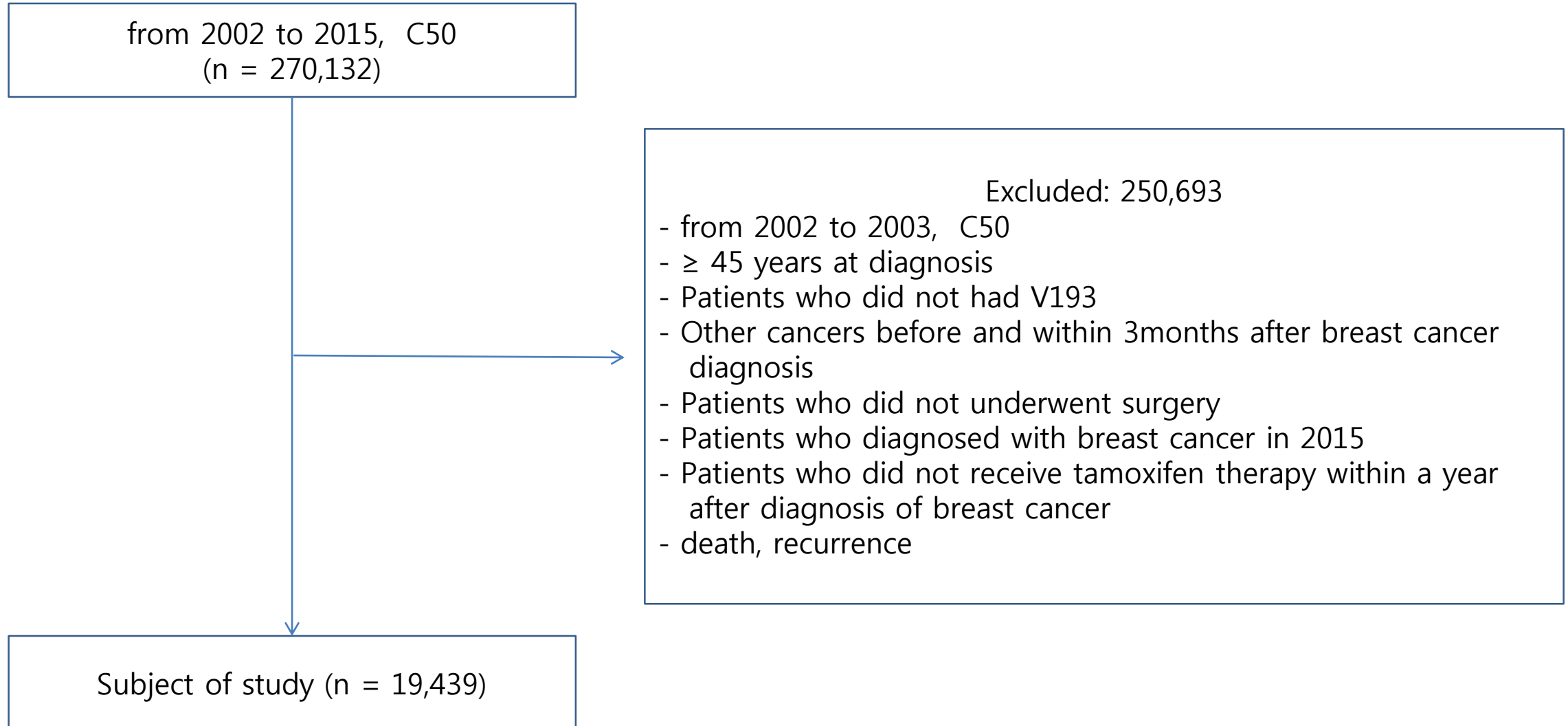
# Effect of depression before breast cancer diagnosis on adherence to adjuvant tamoxifen in premenopausal women

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- Depression before breast cancer diagnosis
  - Patients who had depression earlier than 3 months before diagnosis of breast cancer
  - Depression: F32, 33, 34, 38, 39
- Premenopausal women: < 45 years



# Effect of depression before breast cancer diagnosis on adherence to adjuvant tamoxifen in premenopausal women



Early adherence to adjuvant tamoxifen in premenopausal breast cancer women

Duration of therapy	Adherence to adjuvant tamoxifen
Year 1	83.10%
Year 2	74.06%

**Effect of depression before breast cancer diagnosis**

Year 1

	Nonadherent n=3285 No.(%)	Adherent n=16154 No.(%)	p-value
Depression before breast cancer diagnosis			0.9167
No	3057 (16.89)	15041 (83.11)	
Yes	228 (17.00)	1113 (83.00)	

Year 2

	Nonadherent n=4427 No.(%)	Adherent n=12641 No.(%)	p-value
Depression before breast cancer diagnosis			0.9616
No	4134 (25.96)	11807 (74.07)	
Yes	293 (26.00)	834 (74.00)	

# Weaknesses of NHID

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- Disease codes may not represent patient's true disease status because these were established for medical service claims, not for research purpose.
- Non-insurance benefits data such as cosmetic surgeries and information for over-the-counter drugs have not been included.
- Evaluating details of a patient's specific medical treatment is difficult if a patient's insurance claims were made under the DRG (diagnosis-related-group) policy.

# Weaknesses of NHIS - NSC

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- Although national sample cohort database comprises over one million participants, information on rare diseases may not be sufficient.

# Summary

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- NHID is a public database of medical information from the whole population of Korea
- NHID is a good source of cancer-related epidemiological studies
  - Especially, with the use of V193 code (special registration code for cancer)

# Summary

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- Based on the results from the NHID analysis, this database seems to reflect well incidence and treatment patterns of Korean breast cancer patients.
- We are currently conducting several studies on breast cancer survivorship using NHID and some results are very interesting.

# Summary

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- Although NHID has some weaknesses, NHID can be a good source for research on breast cancer survivorship.
- Research using NHID can help us understand Korean breast cancer survivors.



Thank you for your attention

