

Epidemiologic Studies: Induced Abortion and Breast Cancer Risk

Updated November, 2014

Total Studies = 73
Positive Correlation = 57
Statistically Significant = 34
Meta-Analyses = 3

Studies:

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
1	1957	Segi M, et al. An epidemiological study on cancer in Japan. <i>GANN</i> . 48 1957;1-63.	2.63 (1.85-3.75)	Yes	Positive	Japan
2	1968	Watanabe H, et al. Epidemiology and clinical aspects of breast cancer. [in Japanese], <i>Nippon Rinsho</i> 26, no. 8. 1968;1843-1849.	1.51 (0.91-2.53)		Positive	Japan
3	1978	Dvoyrin VV, et al. Role of women's reproductive status in the development of breast cancer. <i>Methods and Progress in Breast cancer Epidemiology Research</i> Tallin 1978;53-63.	1.71 (0.80-3.64)		Positive	USSR/ Estonia
4	1979	Burany B. Gestational characteristics in women with breast cancer. <i>Jugosil Ginekol Opstet</i> 1979;19:237-47 (in Serbo-Croatian).	0.50 (0.33-0.74)		Negative	Yugoslavia
5	1981	Pike MC, et al. Oral contraceptive use and early abortion as risk factors for breast cancer in young women. <i>Br J Cancer</i> 43, no. 1. 1981;72-6.	2.37 (0.85-6.93)		Positive	United States
6	1982	Nishihyama, F. The epidemiology of breast cancer in Tokushima prefecture. <i>Shikoku Ichi</i> 1982; 38:333-43 (in Japanese).	2.52 (1.99-3.20)	Yes	Positive	Japan
7	1983	Brinton LA, et al. Reproductive factors in the etiology of breast cancer. <i>Br J Cancer</i> 47, no. 6. 1983:757-762.	1.2 (0.6-2.3)		Positive	United States
8	1984	Le M-G, Bachelot A, et al. Oral contraceptive use and breast or cervical cancer: Preliminary results of a case-control study In: Wolff J-P, Scott JS, eds. Hormones and sexual factors in human cancer aetiology. Amsterdam: <i>Elsevier</i> 1984:139-47.	1.3 (0.97-1.77)		Positive	France
9	1985	Hirohata T, et al. Occurrence of breast cancer in relation to diet and reproductive history: a case-control study in Fukuoka, Japan. <i>Natl Cancer Inst Monographs</i> 69 1985:187-90.	1.52 (0.93-2.48)		Positive	Japan
10	1987	LaVecchia C, et al. General epidemiology of breast cancer in northern Italy. <i>Intl J of Epidemiol.</i> 1987;16 3:347-355.	1.19 (0.82-1.71)		Positive	Italy
11	1988	Ewertz M, et al. Risk of breast cancer in relation to reproductive factors in Denmark. <i>Br J Cancer</i> 58, no. 1 1988:99-104.	3.85 (1.08-13.6)	Yes	Positive	Denmark
12	1988	Luporsi E. (1988), in Andrieu N, Duffy SW, Rohan TE, Le MG, Luporsi E, Gerber M, Renaud R, Zaridze DG, Lifanova Y, Day NE. Familial risk, abortion and their interactive effect on the risk of breast cancer—a combined analysis of six case-control studies. <i>Br J Cancer</i> 1995;72:744-751.	1.8 (1.0-3.5)	Yes	Positive	France

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
13	1988	Zaridze DG. (1988) in Andrieu N, Duffy SW, Rohan TE, Le MG, Luporsi E, Gerber M, Renaud R, Zaridze DG, Lifanova Y, Day NE. Familial risk, abortion and their interactive effect on the risk of breast cancer—a combined analysis of six case-control studies. <i>Br J Cancer</i> 1995;72:744-751.	2.7 (0.7-10.3) [if ≥ 2 IA 4.0 (2.1-7.8)]	Yes	Positive	Russia
14	1988	Rosenberg L, et al. Breast cancer in relation to the occurrence and the time of the induced and spontaneous abortion. <i>Amer J Epidemiol</i> 127, no. 5 1988:981-989.	1.2 (1.0-1.6)	Yes	Positive	United States
15	1989	Harris BM, et al. Risk of cancer of the breast after legal abortion during first trimester: a Swedish register study. <i>Br Medical J</i> 299, no. 6713 1989:1430-2.	0.77 (0.58-0.99)		Negative	Sweden/ Norway
16	1989	Howe HL, et al. Early abortion and breast cancer risk among women under age 40. <i>Intl J Epidemiol</i> 18, no. 2 1989:300-4.	1.9 (1.2-3.0)	Yes	Positive	United States
17	1989	Remennick L. Reproductive patterns in cancer incidence in women: A population based correlation study in the USSR. <i>Intl J Epidemiol</i> 1989 (18) 3:498-510.	data not in form of OR		Positive	USSR
18	1990	Adami HO, et al. Absence of association between reproductive variables and the risk of breast cancer in young women in Sweden and Norway. <i>Br J Cancer</i> 62, no. 1 1990:122-6	0.8 (0.5-1.1) [if ≥ 2 IA 1.3 (0.6-3.0)]		Positive	Sweden/ Norway
19	1991	Parazzini F, et al. Spontaneous and induced abortions and risk of breast cancer. <i>Intl J Cancer</i> 48, no. 6 1991:816-20.	1.0 (0.8-1.3)		Negative	Italy
20	1992	Parazzini F, et al. Menstrual and reproductive factors and breast cancer in women with family history of the disease. <i>Intl J of Cancer</i> vol 51 1992:677-681.	0.9 (0.8-1.1)		Negative	Italy
21	1993	Laing AE, et al. Breast cancer risk factors in African-American women: The Howard University tumor registry experience. <i>J Natl Med Assoc</i> 85 1993:931-939.	4.7 (2.6-8.4) if IA and diagnosed BC ≥ 50 yo [1.5 (0.7-3.5) if BC ≤ 40 yo]	Yes	Positive	United States
22	1993	La Vecchia C, et al. Long-term impact of reproductive factors on cancer risk. <i>Int J Cancer</i> 53, no. 2 1993:215-9.	1.0 p < 0.05		Negative	Italy
23	1993	Moseson M, et al. The influence of medical conditions associated with hormones on the risk of breast cancer. <i>Int J Epidemiol</i> 1993;22:1000-9.	1.0 (0.7-1.4)		Negative	United States
24	1994	Andrieu N, Clavel F, Gairard B, Piana L, Bremond A, Lansac J, Flamant R, Renaud R. Familial risk of breast cancer and abortion. <i>Cancer Detect Prevent</i> 1994;18(1):51-55.	1.2 (0.8-1.8)		Positive	France
25	1994	Daling JR, et al. Risk of breast cancer among young women: relationship to induced abortion. <i>J Natl Cancer Inst</i> 86, no. 21 1994;1584-92.	1.5 (1.2-1.9)	Yes	Positive	United States
26	1994	Laing AE, et al. Reproductive and lifestyle factors for breast cancer in African-American women. <i>Gent Epidemiol</i> 1994;11:A300.	2.4 (1.0-6.0)	Yes	Positive	United States

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
27	1994	White E, et al. Breast cancer among young US women in relation to oral contraceptive use. <i>J Natl Cancer Inst</i> 1994;86:505-14.	1.36 (1.11-1.67) [if IA before FFTP and nulliparous 1.7 (1.11-2.6)]	Yes	Positive	United States
28	1995	Andrieu N, Duffy SW, Rohan TE, Le MG, Luporsi E, Gerber M, Renaud R, Zaridze DG, Lifanova Y, Day NE. Familial risk, abortion and their interactive effect on the risk of breast cancer—a combined analysis of six case-control studies. <i>Br J Cancer</i> 1995;72:744-751.	1.5 (1.1-1.9)	Yes	Positive	Multi-National
29	1995	Brinton LA, et al. Oral contraceptives and breast cancer risk among younger women. <i>J Natl Cancer Inst</i> 1995;87:827-35.	[0.98 (0.8-1.2) if 1 IA] [1.02 (0.8-1.4) if ≥ 2 IA]		Negative	United States
30	1995	Bu L, et al. Risk of breast cancer associated with induced abortion in a population at low risk of breast cancer. <i>Amer J Epidemiol</i> 141 1995;S85.	2.9 (1.9-4.4) [if BrCa ≤ 35 yo 4.5 (1.9-10.7)] [if ≤ 2 IA 3.6 (2.2-6.0)]	Yes	Positive	China
31	1995	Lipworth L, et al. Abortion and the risk of breast cancer: a case-control study in Greece. <i>Intl J Cancer</i> 61, no. 2 1995;181-4.	1.51 (1.24-1.84) [if IA before FFTP 2.06 (1.45-2.9)]	Yes	Positive	Greece
32	1995	Rookus MA, et al. Breast Cancer risk after an induced abortion, a Dutch case-control study. <i>Amer J Epidemiol</i> 1995;141:S54 (abstract 214).	1.9 (1.2-3.1)	Yes	Positive	Netherlands
33	1996	Daling JR, Brinton LA, Voigt LF, et al. Risk of breast cancer among white women following induced abortion. <i>Amer J Epidemiol</i> 1996;144:373-380.	1.3 (1.0-1.6)	Yes	Positive	United States
34	1996	Newcomb PA, et al. Pregnancy termination in relation to risk of breast cancer. <i>J Amer Med Assoc</i> 275, no. 4 1996:283-287.	1.23 (1.0-1.51)	Yes	Positive	United States
35	1996	Rookus MA, van Leeuwen FE. Induced abortion and risk for breast cancer: reporting (recall) bias in a Dutch case-control study. <i>J Natl Cancer Inst</i> 1996;88:1759-1764.	1.9 (1.1-3.2) [if before FTP 2.6 (1.0-6.8)]	Yes	Positive	Netherlands
36	1996	Talamini, R, et al. The role of reproductive and menstrual factors in cancer of the breast before and after menopause. <i>European J Cancer</i> 32, no. 2 1996:303-310.	1.2 (1.0-1.5) [if premenopausal BC 1.4 (1.0-2.0)]	Yes	Positive	Italy
37	1996	Tavani A, La Vecchia C, Franceschi S, Negri E, D'avanao B, Decarli A. Abortion and breast cancer risk. <i>Intl J Cancer</i> 1996;65:401-05.	1.2 (1.0-1.5)	Yes	Positive	Italy

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
38	1996	Wu AH, et al. Menstrual and reproductive factors and risk of breast cancer in Asian-Americans. <i>Br J Cancer</i> 73, no. 5 1996:680-6.	1.92 (0.7-5.3)		Positive	United States
39	1997	Melbye M, et al. Induced abortion and the risk of breast cancer. <i>N Engl J Med</i> 336, no. 2 1997:81-85.	1.38 (1.0-1.9) If IA ≥ 12 week gestation [1.89 (1.11-3.22) ≥ 18 wks gestation]	Yes	Positive	Denmark
40	1997	Palmer J. Induced and spontaneous abortion in relation to risk of breast cancer. <i>Cancer Causes and Control</i> 8, no. 6 1997:841-849.	1.4 (0.9-2.2) if 1 IA nulliparous women [1.4 (1.0-1.8) if 1 IA parous women]		Positive	United States
41	1999	Fioretti F. Risk factors for breast cancer in nulliparous women. <i>Br J Cancer</i> 1999 78 (11/12) 1923-1928.	0.97 (0.64-1.47) [if IA ≥ 30 yo 1.75 (1.03-2.97)]	Yes	Positive	Italy
42	1999	Marcus, PM, et al. Adolescent reproductive events and subsequent breast cancer risk. <i>Amer J Public Health</i> 89, no. 8 1999:1244-1247.	1.3 (0.2-9.7) if IA nulliparous		Positive	United States
43	2000	Lazovich D, et al. Induced abortion and breast cancer risk. <i>Epidemiol</i> 11, no. 1 2000:76-80.	1.1 (0.7-1.7) [If IA nulliparous 1.7 (0.6-5.4)]		Positive	United States
44	2000	Newcomb, PA. A record-based evaluation of induced abortion and breast cancer risk. <i>Cancer Causes and Control</i> 11, no. 9 2000:777-781.	0.9 (0.5-1.6)		Negative	United States
45	2000	Tang M, et al. Induced abortion in relation to breast cancer among parous women: A birth certificate registry study. <i>Epidemiology Lippincott Williams & Wilkins</i> 11, no. 2 2000:177-180.	0.9 (0.7-1.2)		Negative	United States
46	2001	Goldacre MJ, et al. Abortion and breast cancer: a case-control record linkage study. <i>J Epidemiol & Community Health</i> 55, no. 5 2001:336-7.	0.83 (0.74-0.93)		Negative	Britain
47	2001	Robertson C, et al. The association between induced and spontaneous abortion and risk of breast cancer in Slovenian women aged 25-54. <i>Breast</i> 2001;10:291-298.	2.71 (0.72-10.26) if IA nulliparous		Positive	Slovenia
48	2001	Sanderson M, et al. Abortion history and breast cancer risk: Results from the Shanghai Breast Cancer Study. <i>Intl J Cancer</i> 96, no. 6 2001:899-905.	1.3 (0.8-2.3) if IA ≥ 3 and post-menopausal BC		Positive	China

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
49	2002	Ye Z, et al. Breast cancer in relation to induced abortions in a cohort of Chinese women. <i>Br J Cancer</i> 87, no. 9. 2002:976.	1.06 (0.9-1.25) [if IA ≥ 13 wks 1.95 (0.83-4.56)] [if IA before FFTP 2.16 (0.79-5.91)]		Positive	China
50	2003	Becher H, Schmidt S, Chang-Claude J. Reproductive factors and familial predisposition for breast cancer by age 50 years. A Case control family study for assessing main effects and possible gene-environment interaction. <i>Intl J Epidemiol</i> 2003;32:38-50.	1.35 (1.03-1.78)	Yes	Positive	Germany
51	2003	Erlandsson G, et al. Abortions and breast cancer: record-based case-control study. <i>Intl J Cancer</i> 103, no. 5. 2003:676-9.	0.8 (0.63-1.02)		Negative	Sweden
52	2003	Mahue-Giangreco M, Ursin G, Sullivan-Halley J, Bernstein L. Induced abortion, miscarriage, and breast cancer risk of young women. <i>Cancer Epidemiol Biomarkers & Prev</i> 2003;12:209-214.	1.05 (0.75-1.48)		Positive	United States
53	2003	Paoletti X, Clavel-Chapelon F. Induced and spontaneous abortion and breast cancer risk: results from the E3N cohort study. <i>Intl J Cancer</i> 106, no. 2 2003:270-6.	0.91 (0.82-0.99)		Negative	France
54	2004	Meeske K, et al. Impact of reproductive factors and lactation on breast carcinomas in situ. <i>Intl J Cancer</i> 2004 110:103-109.	1.04 (0.56-1.94)		Positive	United States
55	2004	Palmer JR, et al. A prospective study of induced abortion and breast cancer in African-American women. <i>Cancer Causes & Control</i> 15, no. 2 2004:105-11.	1.1 (0.8-1.4) parous women [0.9 (0.5-1.4) nulliparous women]		Positive	United States
56	2005	Brewster DH. Risk of breast cancer after miscarriage or induced abortion: a Scottish record linkage case-control study. <i>J Epidemiol & Community Health</i> 59, no. 4 2005:283-287.	0.8 (0.72-0.89)		Negative	Scotland
57	2006	Reeves GK. Breast cancer risk in relation to abortion: Results from the EPIC study. <i>Intl J Cancer</i> 119, no. 7 2006:1741-5.	0.95 (0.87-1.03) (8 countries: 4 with positive association)		Negative	Europe
58	2006	Rosenblatt K. Induced abortions and the risk of all cancers combined and site-specific cancers in Shanghai. <i>Cancer Causes and Control</i> 17, no. 10 2006:1275-1280.	1.01 (.92-1.12)		Positive	China
59	2006	Tehrani N, et al. The effect of abortion on the risk of breast cancer. Iranian study presented at a conference at McMaster University. Available at: http://www.hdl.handle.net/10755/163877	7.94 (2.05-26.21)	Yes	Positive	Iran
60	2007	Michels KB. Induced and spontaneous abortion and incidence of breast cancer among young women. <i>Archives of Internal Medicine</i> 167, no. 8 2007:814-820.	1.01 (0.88-1.87) if IA nulliparous		Negative	United States
61	2007	Naieni K, et al. Risk factors of breast cancer in north of Iran: a case-control in Mazandaran Province. <i>Asian Pacific J Cancer Prev</i> 8, no. 3 2007:395-8.	1.62 (1.13-2.31)	Yes	Positive	Iran

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
62	2008	Henderson K. Incomplete pregnancy is not associated with breast cancer risk: the California Teachers Study. <i>Contraception</i> 77, no. 6 2008:391-396	0.98 (0.77-1.25) if nulliparous [1.08 (0.93-1.24) if parous]		Positive	United States
63	2008	Lin, J et al. A case control study on risk factors of breast cancer among women in Cixi. <i>Zhejiang Preventive Medicine</i> , vol. 20, no. 6 June 2008:3-5.	1.64 (1.06-2.52)	Yes	Positive	China
64	2009	Dolle J, et al. Risk Factors for Triple-negative breast cancer in women under the age of 45 years. <i>Cancer Epidemiol Biomarkers Prev</i> 18, no. 4 2009:1157-66.	1.4 (1.1-1.8)	Yes	Positive	United States
65	2009	Ozmen V, et al. Breast cancer risk factors in Turkish women--a University Hospital based nested case control study. <i>World J Surgical Oncology</i> 7, no. 37 2009.	1.66 (1.38-1.99)	Yes	Positive	Turkey
66	2009	Xing P, et al. A case-control study of reproductive factors associated with subtypes of breast cancer in Northeast China. <i>Medical Oncology</i> 2009.	1.26 (1.05-1.52) for luminal A breast cancer	Yes	Positive	China
67	2011	Khachatryan L, et al. Influence of diabetes mellitus type 2 and prolonged estrogen exposure on risk of breast cancer among women in Armenia. <i>Health Care for Women Intl</i> , no. 32 2011:953-971.	2.86 (1.02-8.04) [1.77 (1.0-3.12) if 1-3 IA]	Yes	Positive	Armenia
68	2012	Jiang AR, et al. Abortions and breast cancer risk in premenopausal and postmenopausal women in Jiangsu Province of China. <i>Asian Pacific J Cancer Prev</i> 2012;13:33-35. Available at: http://www.apjcpcontrol.org/page/popup_paper_file_view.php?pno=MzMtMzUgMTluMiZrY29kZT0yNzAxJmZUbz0w&pgubun=i	≥3 IAs 2.50 (1.41-4.42)	Yes	Positive	China
69	2012	Lecarpentier J, et al. Variation in breast cancer risk associated with factors related to pregnancies according to truncating mutation location, in the French National BRCA1 and BRCA2 mutations carrier cohort (GENEPSO). <i>Breast Cancer Research</i> 2012, 14:R99. Available at: http://breast-cancer-research.com/content/14/4/R99 .	IA before FFTP 1.7(1.19-2.63)	Yes	Positive	France
70	2012	Yanhua, C, et al. Reproductive Variables and Risk of Breast Malignant and Benign Tumours in Yunnan Province, China. <i>Asian Pacific J Cancer Prev</i> 2012;13, 2179-2184. Available at: http://www.apocpcontrol.org/paper_file/issue_abs/Volume13_No5/2179-84%204.17%20Che%20Yanhua.pdf	1 AB OR 2.5 (1.38-4.52) > 2 AB OR 12.31 (5.02-30.20)	Yes	Positive	China
71	2013	Brauner, C, et al. Induced abortion and breast cancer risk among parous women: A Danish cohort study. <i>Acta Obstetrica et Gynecologica Scandinavica</i> 2013. Available at: http://onlinelibrary.wiley.com/doi/10.1111/aogs.12107/abstract	0.95 (0.83-1.09)		Negative	Denmark
72	2013	Jabeen S, et al. Breast cancer and some epidemiological risk factors: A hospital based study, J Dhaka Med Coll 2013;22(1)61-66.	20.62 CI (12.85-32.51)	Yes	Positive	Bangladesh

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
73	2013	Kamath R, et al. A study on risk factors of breast cancer among patients attending the tertiary care hospital in Udipi district. <i>Indian J Community Med</i> 2013;38(2)95-99. Available from: http://www.ijcm.org.in/text.asp?2013/38/2/95/112440	0.95 6.38 (0.99-40.81)		Positive	India

Meta-analyses

No.	Year	Reference	OR (95% CI)	Statistically Significant	Pos/Neg Correlation	Country/ Population
1	1996	Brind J, et. al. Induced abortion as an independent risk factor for breast cancer: A comprehensive review and meta-analysis. <i>J of Epidemiol Community Health</i> 1996;50:481-496.	1.3 (1.2-1.4)	Yes	Positive	International
2	2004	Beral V, et. al. Collaborative group on hormonal factors in breast cancer, Breast cancer and abortion: collaborative reanalysis of data from 53 epidemiological studies, including 83,000 women with breast cancer from 16 countries. <i>The Lancet</i> 2004;363:1007-1016.	.93 (.89-.96)	Yes	Negative	International
3	2013	Huang, Yubei, et. al. A meta-analysis of the association between induced abortion and breast cancer risk among Chinese females. <i>Cancer Causes Control</i> . Accepted Nov 11, 2013. Available from: http://link.springer.com/article/10.1007%2Fs10552-013-0325-7	One IA 1.44 95% (1.29-1.59) Two IA 1.76 95% (1.39-2.22) Three IA 1.89 95% (1.4-2.55)	Yes	Positive	China

KEY:

BC:	Breast cancer
FFTP:	First full-term pregnancy
IA:	Induced abortion
Luminal A cancer:	Estrogen positive and HER2 negative
Nulliparous:	Never given birth
Parous	Has given birth
OR:	Odd ratio