

Epidemiologic Studies: Induced Abortion and Breast Cancer Risk
Updated August 8, 2013

Total Studies = 73
 Positive Correlation = 57
 Statistically Significant = 34

| 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 | Nishiyama, 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>Intl 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>Intl 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 |

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|-----|------|---|--|---------------------------|---------------------|---------------------|
| 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 |
| 27 | 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 |
| 28 | 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 |
| 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 |

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|-----|------|--|--|---------------------------|---------------------|---------------------|
| 37 | 1996 | Tavani A, La Vecchia C, Franceschi S, Negri E, D'avano 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 |
| 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=MzMtMzUgMTluMiZrY29kZT0yNzAxJmZubzOw&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 | 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 |

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|-----|------|---|---------------------------|------------------------------|------------------------|------------------------|
| 73 | 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 |

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