Effect of Visual inspection with acetic acid (VIA) screening on cervical cancer mortality and incidence - A systematic review and meta-analysis

Contents of the supplementary material

1. Search strategy

1a. Study selection criteria

- Inclusion criteria:
    - Language: Articles in English.
    - Year of publication: Studies published up to 30st June 2020.
    - Data type: Primary research or secondary data analysis of the available data.
    - Study design: Observational as well as interventional studies
    - Study setting: Community based
    - Study population: Women with no history of cervical cancer.
    - Intervention: Cervical cancer screening using VIA method.
    - Comparator: Standard care.
    - Outcomes:
        - Incidence of cervical cancer
        - Mortality due to cervical cancer
        - All-cause mortality.
    - Sufficient data was available in the study to extract incidence/mortality data.
- Exclusion criteria:
    - Studies reporting duplicate data
    - Studies which did not assess the direct effect of screening on cervical cancer mortality
    - Abstracts, conference proceedings, and reviews
    - Modelling studies
    - Studies not conducted on humans.

1b. Keywords used for PubMed search

1	Cervical cancer a. Uterine Cervical Neoplasms [MeSH Terms] b. Uterine Cervical Dysplasia [MeSH Terms] c. Cervical Intraepithelial Neoplasia [MeSH Terms] d. cancer* [tw] e. carcinoma [tw] f. adenocarcinoma [tw] g. neoplas* [tw] h. dysplas* [tw] i. dyskaryos* [tw] j. squamous [tw] k. CIN [tw] l. CINII* [tw] m. CIN2* [tw] n. CINIII* [tw] o. CIN3* [tw] p. SIL [tw] q. HSIL [tw] r. H-SIL [tw] s. LSIL [tw] t. L-SIL [tw] u. ASCUS [tw] v. AS-CUS [tw]
2	Mass screening a. Mass Screening [MeSH Terms] b. Early Diagnosis [MeSH Terms] c. screen*[tw] d. early detect*[tw]
3	Mortality or incidence a. mortality[MeSH Terms] b. incidence [MeSH Terms] c. death rate*[tw]

1c. Search results

Database: PubMed

Date of search: Restricted till 30th June 2020

Item	Search words	# Records
1	Uterine Cervical Neoplasms [MeSH Terms] OR Uterine Cervical Dysplasia [MeSH Terms] OR Cervical Intraepithelial Neoplasia [MeSH Terms]	77,222
2	cancer* [tw] OR carcinoma [tw] OR adenocarcinoma [tw] OR neoplas* [tw] OR dysplas* [tw] OR dyskaryos* [tw] OR squamous [tw] OR CIN [tw] OR CINII* [tw] OR CIN2* [tw] OR CINIII* [tw] OR CIN3* [tw] OR SIL [tw] OR HSIL [tw] OR H-SIL [tw] OR LSIL [tw] OR L-SIL [tw] OR ASCUS [tw] OR AS-CUS [tw]	3,592,201
3	1 AND 2	77,222
4	Mass Screening [MeSH Terms] OR Early Diagnosis [MeSH Terms] OR screen*[tw] OR early detect*[tw]	907,282
5	mortality[MeSH Terms] OR incidence [MeSH Terms] OR death rate*[tw]	634,668
6	3 AND 4 AND 5	1,344
	(((Uterine Cervical Neoplasms [MeSH Terms] OR Uterine Cervical Dysplasia [MeSH Terms] OR Cervical Intraepithelial Neoplasia [MeSH Terms]) AND (cancer* [tw] OR carcinoma OR adenocarcinoma OR neoplas* [tw] OR dysplas* [tw] OR dyskaryos* [tw] OR squamous [tw] OR CIN [tw] OR CINII* [tw] OR CIN2* [tw] OR CINIII* [tw] OR CIN3* [tw] OR SIL [tw] OR HSIL [tw] OR H-SIL [tw] OR LSIL [tw] OR L-SIL [tw] OR ASCUS [tw] OR AS-CUS [tw])) AND (Mass Screening [MeSH Terms] OR Early Diagnosis [MeSH Terms] OR screen*[tw] OR early detect*[tw]) AND (mortality[MeSH Terms] OR incidence [MeSH Terms] OR death rate*[tw]))	1,344

Database: EMBASE

Date of search: Restricted till 30th June 2020

	Search words	# records
EMBASE	('uterine cervix tumor'/exp OR ((cervix* OR cervical*) NEAR/10 (cancer* OR neoplas* OR tumo* OR carcino* OR adenocarcin* OR cytolog*)):ab,ti) AND (screening/exp OR 'early diagnosis'/de OR (screen* OR ((annual* OR periodic*) NEAR/3 examination*)) OR (early NEAR/3 (diagnos* OR detect*)):ab,ti)	2,927

	AND (mortality/de OR 'cancer mortality'/de OR (mortalit* OR (death NEXT/1 rate*)):ab,ti)	

Database: Cochrane library (Cochrane Database of Systematic Reviews & Cochrane Central Register of Controlled Trials)

	Search words	# records
Cochrane library	(((cervix* OR cervical*) NEAR/10 (cancer* OR neoplas* OR tumo* OR carcino* OR adenocarcin* OR cytolog*)):ab,ti) AND ((screen* OR ((annual* OR periodic*) NEAR/3 examination*)) OR (early NEAR/3 (diagnos* OR detect*))) AND ((mortalit* OR (death NEXT/1 rate*)):ab,ti)	144 (1 review and 143 trials)

Database: Google Scholar: First 1,500 articles were searched for the relevant articles.

	Search words
Google Scholar	(cervix/cervical cancer/neoplasm/tumor/carcinoma/adenocarcinoma/cytology screening mortality/"death rate")

2. Table S1. List of articles excluded from the review with reasons

S. No.	Author	Title	Journal	Year	Reason for exclusion
1	Thulaseedharan JV et al	Effect of screening on the risk estimates of socio demographic factors on cervical cancer - a large cohort study from rural India.	Asian Pacific journal of cancer prevention : APJCP	2013	No mortality/incidence estimates
2	Li R et al	Analysis of the effectiveness of visual inspection with acetic acid/Lugol's iodine in one-time and annual follow-up screening in rural China.	Archives of gynecology and obstetrics	2012	No mortality/incidence estimates
3	Denny L et al	Human papillomavirus-based cervical cancer prevention: long-term results of a randomized screening trial.	Journal of the National Cancer Institute	2010	No mortality/incidence estimates
4	Vedantham H et al	Determinants of VIA (Visual Inspection of the Cervix After Acetic Acid Application) positivity in cervical cancer screening of women in a peri-urban area in Andhra Pradesh, India.	Cancer epidemiology, biomarkers & prevention	2010	No mortality/incidence estimates
5	Wu RF et al	[Prevalence of high-risk human papillomavirus and incidence of cervical intraepithelial neoplasia in female populations in Shenzhen, Guangdong Province].	Acta Academiae Medicinae Sinicae	2010	No mortality/incidence estimates
6	Sankaranarayanan R et al	Cervical cancer: screening and therapeutic perspectives.	Medical principles and practice	2008	No mortality/incidence estimates
7	Anorlu RI et al	Low cost methods for secondary prevention of cervical cancer in developing countries.	The Nigerian postgraduate medical journal	2007	No mortality/incidence estimates
8	Li N et al	[Evaluation on the visual inspection with Lugol's iodine in cervical cancer screening program].	Zhonghua liu xing bing xue za zhi	2006	No mortality/incidence estimates
9	Sankaranarayanan R et al	A critical assessment of screening methods for cervical neoplasia.	International journal of gynaecology and obstetrics	2005	No mortality/incidence estimates
10	Okewole IA et al	Does screening for cervical intra-epithelial neoplasm in developing countries prevent invasive cervical cancer?	African journal of medicine and medical sciences	2003	No mortality/incidence estimates
11	Ananth R et al	Downstaging of cervical cancer.	Journal of the Indian Medical Association	2000	No mortality/incidence estimates
12	Hristova L et al	Effect of screening for cancer in the Nordic countries on deaths, cost and quality of life up to the year 2017.	Acta oncologica (Stockholm, Sweden)	1997	No mortality/incidence estimates
13	Dykens J.A. et al	Evaluating the implementation of cervical cancer screening programs in low-resource settings globally: a systematized review	Cancer Causes Control	2020	No mortality/incidence estimates
14	Pimple S.A. et al	Optimizing high risk HPV-based primary screening for cervical cancer in low- And middle-income countries: Opportunities and challenges	Minerva Ginecol.	2019	No mortality/incidence estimates
15	Matambo J. et al	A decade of cervical cancer screening: Trends of incidence in zambia	J. Glob. Oncol.	2018	No mortality/incidence

S. No.	Author	Title	Journal	Year	Reason for exclusion
		(2007-2017)			estimates
16	Carl-Spencer R.	Strengthening cervical cancer screening program in low resource-setting communities: IPPF success in employing the single-visit approach	J. Glob. Oncol.	2018	No mortality/incidence estimates
17	Fatima A. et al	Inspection of cervix using acetic acid - A good alternative to Pap smear in underdeveloped countries	Eur. J. Cancer	2017	No mortality/incidence estimates
18	Morris S.A. et al	Sustainable cervical cancer prevention clinics using the world health organization â€œsee and treatâ€• method: A five country experience	Reprod. Sci.	2016	No mortality/incidence estimates
19	Chowdhury A. et al	Colposcopic evaluation of via positive cases in cervical cancer screening-study in a tertiary hospital in Bangladesh	Int. J. Gynecol. Obstet.	2015	No mortality/incidence estimates
20	Pathak R. et al	Using supportive supervision to improve quality of cervical cancer screening services in Uttar Pradesh, India	Int. J. Gynecol. Obstet.	2015	No mortality/incidence estimates
21	Chaudhury N. et al	Engaging the private sector to support scale-up of cervical cancer screening and preventative treatment services in Uttar Pradesh, India	Int. J. Gynecol. Obstet.	2015	No mortality/incidence estimates
22	Firnhaber C. et al	One-year follow-up of HIV+ women screened with VIA, Cytology and HPV in South Africa	Top. Antiviral Med.	2015	No mortality/incidence estimates
23	DeGregorio G. et al	Evaluation of see-and-treat cervical cancer screening in human immunodeficiency virus-positive and human immunodeficiency virus-negative women in cameroon	Obstet. Gynecol.	2015	No mortality/incidence estimates
24	Lantz P.M. et al	The National Breast and Cervical Cancer Early Detection Program: 25 Years of public health service to low-income women	Cancer Causes Control	2015	No mortality/incidence estimates
25	Bradford L.S. et al	Evaluation of WHO-endorsed â€œsee and treatâ€• cervical cancer screening in HIV-positive and HIV-negative women in Cameroon	Gynecol. Oncol.	2015	No mortality/incidence estimates
26	Campbell C. et al	Use of cold coagulation as treatment modality in a 'see and treat' programme of cervical screening in rural Malawi	Asia-Pac. J. Clin. Oncol.	2014	No mortality/incidence estimates
27	Keita N. et al	Via in West Africa-findings and impact on cervical cancer prevention	Int. J. Gynecol. Obstet.	2012	No mortality/incidence estimates
28	Mbau L. et al	Introducing cervical cancer screening in an informal settlement	HIV Med.	2012	No mortality/incidence estimates
29	Occhi F. et al	Cervical and breast cancer in Uganda: A descriptive analysis of a screening campaign in rural and Urban Areas	Int. J. Gynecol. Cancer	2011	No mortality/incidence estimates
30	Blumenthal P.D. et al	A revolution in cervical screening [4]	BJOG Int. J. Obstet. Gynaecol.	2002	No mortality/incidence estimates
31	Jansen EEL et al	Effect of organised cervical cancer screening on cervical cancer mortality in Europe: a systematic review.	European journal of cancer	2020	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
32	Bucchi L et al	Estimating the impact of an organised screening programme on cervical cancer incidence: A 26-year study from northern Italy.	International journal of cancer	2019	No VIA
33	Misra JS et al	Results of Cervical Cancer Screening in the Rural Population of Lucknow West, India, through a Camp Approach.	Acta cytologica	2018	No VIA
34	Ginindza TG et al	Projected cervical Cancer incidence in Swaziland using three methods and local survey estimates.	BMC cancer	2018	No VIA
35	Wang J et al	Effectiveness of cervical screening after age 60 years according to screening history: Nationwide cohort study in Sweden.	PLoS medicine	2017	No VIA
36	Castillo M et al	[Evaluation of mortality after the analysis of the screening history in women diagnosed with infiltrating cervical cancer].	Atencion primaria	2018	No VIA
37	Lynge E et al	Cervical cancer incidence in elderly women-biology or screening history?	European journal of cancer	2017	No VIA
38	Landy R et al	Impact of cervical screening on cervical cancer mortality: estimation using stage-specific results from a nested case-control study.	British journal of cancer	2016	No VIA
39	Holst S et al	Cervical cancer screening in Greenland, 1997-2011: Screening coverage and trends in the incidence of high-grade cervical lesions.	Gynecologic oncology	2016	No VIA
40	Baldur-Felskov B et al	Trends in the incidence of cervical cancer and severe precancerous lesions in Denmark, 1997-2012.	Cancer causes & control : CCC	2015	No VIA
41	Lannberg S et al	Cervical cancer prevented by screening: Long-term incidence trends by morphology in Norway.	International journal of cancer	2015	No VIA
42	Serraino D et al	Changes in cervical cancer incidence following the introduction of organized screening in Italy.	Preventive medicine	2015	No VIA
43	KolozsvÃ¡ri LR et al	Nationwide screening program for breast and cervical cancers in Hungary: special challenges, outcomes, and the role of the primary care provider.	European journal of gynaecological oncology	2013	No VIA
44	Lee S et al	Assessment of cervical cancer screening policy in Korea for women over age 65.	Journal of geriatric oncology	2013	No VIA
45	DuguÃ© PA et al	Mortality of non-participants in cervical screening: Register-based cohort study.	International journal of cancer	2014	No VIA
46	O'Brien KM et al	Trends in incidence of, and mortality from, cervical lesions in Ireland: baseline data for future evaluation of the national cervical screening programme.	Cancer epidemiology	2013	No VIA
47	Oh CM et al	Trends in the incidence of in situ and invasive cervical cancer by age group and histological type in Korea from 1993 to 2009.	PloS one	2013	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
48	Simonella L et al	The impact of a two- versus three-yearly cervical screening interval recommendation on cervical cancer incidence and mortality: an analysis of trends in Australia, New Zealand, and England.	Cancer causes & control : CCC	2013	No VIA
49	Popadiuk C et al	Invasive cervical cancer incidence and mortality among canadian women aged 15 to 29 and the impact of screening.	Journal of obstetrics and gynaecology	2012	No VIA
50	Dickinson JA et al	Reduced cervical cancer incidence and mortality in Canada: national data from 1932 to 2006.	BMC public health	2012	No VIA
51	Sasieni P et al	Dramatic increase in cervical cancer registrations in young women in 2009 in England unlikely to be due to the new policy not to screen women aged 20-24.	Journal of medical screening	2012	No VIA
52	Aminisani N et al	Impact of organised cervical screening on cervical cancer incidence and mortality in migrant women in Australia.	BMC cancer	2012	No VIA
53	LÃ¶nnberg S et al	Mortality audit of the Finnish cervical cancer screening program.	International journal of cancer	2013	No VIA
54	Patel A et al	Cervical cancer incidence in young women: a historical and geographic controlled UK regional population study.	British journal of cancer	2012	No VIA
55	Sasieni P et al	Effectiveness of cervical screening with age: population based case-control study of prospectively recorded data.	BMJ (Clinical research ed.)	2009	No VIA
56	Chen YY et al	Effectiveness of national cervical cancer screening programme in Taiwan: 12-year experiences.	British journal of cancer	2009	No VIA
57	Sykes P et al	Screening the hard to reach: improving morbidity and mortality from cervical cancer in New Zealand.	The New Zealand medical journal	2008	No VIA
58	van der Aa MA et al	Mass screening programmes and trends in cervical cancer in Finland and the Netherlands.	International journal of cancer	2008	No VIA
59	Kotaniemi-Talonen L et al	Significant variation in performance does not reflect the effectiveness of the cervical cancer screening programme in Finland.	European journal of cancer	2007	No VIA
60	Zeferino LC et al	Organization of cervical cancer screening in Campinas and surrounding region, SÃ£o Paulo State, Brazil.	Cadernos de saude publica	2006	No VIA
61	Aklimunnessa K et al	Effectiveness of cervical cancer screening over cervical cancer mortality among Japanese women.	Japanese journal of clinical oncology	2006	No VIA
62	Sigurdsson K et al	Effectiveness of cervical cancer screening in Iceland, 1964-2002: a study on trends in incidence and mortality and the effect of risk factors.	Acta obstetricia et gynecologica Scandinavica	2006	No VIA
63	Taylor R et al	Decline in cervical cancer incidence and mortality in New South Wales in relation to control activities (Australia).	Cancer causes & control : CCC	2006	No VIA
64	Ronco G et al	Impact of the introduction of organised screening for cervical cancer in	British journal of cancer	2005	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
		Turin, Italy: cancer incidence by screening history 1992-98.			
65	Smrkolj S et al	Evaluation of causes of increased incidence of cervical cancer in Slovenia.	European journal of obstetrics, gynecology, and reproductive biology	2004	No VIA
66	Insinga RP et al	Diagnoses and outcomes in cervical cancer screening: a population-based study.	American journal of obstetrics and gynecology	2004	No VIA
67	Siemens FC et al	Population-based cervical screening with a 5-year interval in The Netherlands. Stabilization of the incidence of squamous cell carcinoma and its precursor lesions in the screened population.	Acta cytologica	2004	No VIA
68	Becker N	Epidemiological aspects of cancer screening in Germany.	Journal of cancer research and clinical oncology	2003	No VIA
69	Chan PG et al	Changes in cervical cancer incidence after three decades of screening US women less than 30 years old.	Obstetrics and gynecology	2003	No VIA
70	Baker D et al	Cervical screening and health inequality in England in the 1990s.	Journal of epidemiology and community health	2003	No VIA
71	Raffle AE et al	Outcomes of screening to prevent cancer: analysis of cumulative incidence of cervical abnormality and modelling of cases and deaths prevented.	BMJ (Clinical research ed.)	2003	No VIA
72	Breitenecker G et al	Cervical cancer screening in Austria.	European journal of cancer	2000	No VIA
73	Schootman M et al	Breast and cervical carcinoma: the correlation of activity limitations and rurality with screening, disease incidence, and mortality.	Cancer	1999	No VIA
74	Anttila A et al	Effect of organised screening on cervical cancer incidence and mortality in Finland, 1963-1995: recent increase in cervical cancer incidence.	International journal of cancer	1999	No VIA
75	Lancaster EJ et al	Carcinoma of the uterine cervix: results of Ka-Ngwane screening programme and comparison between the results obtained from urban and other unscreened rural communities.	East African medical journal	1999	No VIA
76	Sigurdsson K	The Icelandic and Nordic cervical screening programs: trends in incidence and mortality rates through 1995.	Acta obstetricia et gynecologica Scandinavica	1999	No VIA
77	Sasieni P et al	Effect of screening on cervical cancer mortality in England and Wales: analysis of trends with an age period cohort model.	BMJ (Clinical research ed.)	1999	No VIA
78	Walker JJ et al	Trends in incidence of and mortality from invasive cancer of the uterine cervix in Scotland (1975-1994).	Public health	1998	No VIA
79	HernÃ¡ndez-Avila	Evaluation of the cervical cancer screening programme in Mexico: a	International journal of	1998	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
	M et al	population-based case-control study.	epidemiology		
80	Sato S et al	Mass screening for cancer of the uterine cervix in Miyagi Prefecture, Japan. Effects and problems.	Acta cytologica	1998	No VIA
81	Gustafsson L et al	International incidence rates of invasive cervical cancer before cytological screening.	International journal of cancer	1997	No VIA
82	Juneja A et al	Reduction in the cumulative incidence rate of cervical cancer by one life time selective screening.	Neoplasma	1997	No VIA
83	Martin LM et al	Cervical cancer incidence and screening: status report on women in the United States.	Cancer practice	1996	No VIA
84	Herbert A et al	Invasive cervical cancer in Southampton and South West Hampshire: effect of introducing a comprehensive screening programme.	Journal of medical screening	1996	No VIA
85	Nieminen P et al	The effect of mass screening on incidence and mortality of squamous and adenocarcinoma of cervix uteri.	Obstetrics and gynecology	1995	No VIA
86	BergstrÃ¶m R et al	Detection of preinvasive cancer of the cervix and the subsequent reduction in invasive cancer.	Journal of the National Cancer Institute	1993	No VIA
87	Sigurdsson K	Effect of organized screening on the risk of cervical cancer. Evaluation of screening activity in Iceland, 1964-1991.	International journal of cancer	1993	No VIA
88	Aareleid T et al	Cervical cancer incidence and mortality trends in Finland and Estonia: a screened vs. an unscreened population.	European journal of cancer	1993	No VIA
89	Hakama M	Potential contribution of screening to cancer mortality reduction.	Cancer detection and prevention	1993	No VIA
90	Cox B et al	Projections of cervical cancer mortality and incidence in New Zealand: the possible impact of screening.	Journal of epidemiology and community health	1992	No VIA
91	Lynge E et al	[The significance of organized screening for uterine cervix cancer in Denmark during 1968-1987].	Ugeskrift for laeger	1992	No VIA
92	Kirn VP et al	Epidemiological evaluation of cervical cancer screening in Slovenia up to 1986.	European journal of gynaecological oncology	1992	No VIA
93	Sigurdsson K et al	Trends in cervical and breast cancer in Iceland. A statistical evaluation of trends in incidence and mortality for the period 1955-1989, their relation to screening and prediction to the year 2000.	International journal of cancer	1991	No VIA
94	Louhivuori K	Effect of a mass screening program on the risk of cervical cancer.	Cancer detection and prevention	1991	No VIA
95	GrÃ¼nfeld K et al	Evaluation of mortality data for cervical cancer with special reference to mass screening programs, Denmark, 1961-1971.	American journal of epidemiology	1975	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
96	Homola W. et al	The development of screening, diagnosis and management with abnormal Pap test results	Ginekol. Poloz.	2019	No VIA
97	Abdulrahman G.O.	Changing trends in cervical cancer in Wales: 1985-2012	BJOG Int. J. Obstet. Gynaecol.	2017	No VIA
98	Autier P. et al	Cervical and breast cancer mortality trends in neighboring countries with different screening policies	J. Clin. Oncol.	2016	No VIA
99	Fiala M.A. et al	The impact of the national breast and cervical cancer early detection program (NBCCEDP) in reducing outcome disparities based on race	J. Clin. Oncol.	2015	No VIA
100	Beddoe A.M. et al	Incidence of human papillomavirus, cervical dysplasia and cervical cancer among women in Liberia: Assessing the burden of disease	Gynecol. Oncol.	2015	No VIA
101	Weiss N.S.	Cohort studies of the efficacy of screening for cancer	Epidemiology	2015	No VIA
102	Caleffi M. et al	Mortality profile of women recruited in a 10-years breast cancer screening cohort	Asia-Pac. J. Clin. Oncol.	2014	No VIA
103	Yoo K.-Y.	National cancer screening program and improvement in cancer survival in Korea	Anticancer Res.	2014	No VIA
104	Vicus D. et al	The association between cervical cancer screening and mortality from cervical cancer: A population based case-control study	Gynecol. Oncol.	2014	No VIA
105	Ekwueme D.U. et al	Impact of the national breast and cervical cancer early detection program on cervical cancer mortality among uninsured low-income women in the U.S., 1991-2007	Am. J. Prev. Med.	2014	No VIA
106	Ekwueme D.U. et al	Impact of the national breast and cervical cancer early detection program on cervical cancer mortality among uninsured low-income women in the U.S., 1991-2007	Am. J. Prev. Med.	2014	No VIA
107	DuÅ¡kovÃ¡ J. et al	Results of the czech national cervical cancer screening programme	VÃ½sledky nÃ¡rodnÃho programu screeningu karcÃ-nomu dÄ›loÅ¾nÃho hrdla v Ä • eskÃ© republice	2014	No VIA
108	Peirson L. et al	Screening for cervical cancer: A systematic review and meta-analysis	Syst. Rev.	2013	No VIA
109	Singh K.P. et al	The potential impact of the Deep South Network for Cancer Control on cervical cancer mortality among black females in historically underserved areas of Alabama	J. Clin. Oncol.	2013	No VIA
110	Roder D.	Impact of population screening programs on cancer outcomes	Cancer Forum	2012	No VIA
111	Murphy J. et al	HPV Testing in Primary Cervical Screening: A Systematic Review and Meta-Analysis	J. Obstet. Gynaecol. Can.	2012	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
112	Kmietowicz Z.	Screening has halved incidence of cervical cancer in UK.	BMJ	2009	No VIA
113	Zahl P.H.	No effect of organized cervix cancer screening	Ingen effekt av organisert screening for livmorhalskreft.	2008	No VIA
114	Minelli L. et al	Epidemiological overview on the effectiveness of mass screening for female cancer in Umbria, Italy	Eur. J. Gynaecol. Oncol.	2007	No VIA
115	Peto P.J. et al	The cervical cancer epidemic that screening has prevented in the UK	Lancet	2004	No VIA
116	Paci E. et al	The impact of screening and early diagnosis on survival--results from the Italian cancer registries.	Epidemiol Prev	2001	No VIA
117	Zahl P.H.	Is the benefit of organized mass screening for cervix cancer and breast cancer in Norway scientifically justified?	Er nytten av organiserte masseundersÃ¸kelser for livmorhalskreft og brystkreft i Norge vitenskapelig bevist?	2000	No VIA
118	Quinn M. et al	Incidence and mortality of cervical cancer in England: 30-year screening results	Incidence et mortalite du cancer du col uterin en Angleterre: Resultats de 30 annees de depistage	1999	No VIA
119	Vaidya J.S. et al	Screening and mortality from cervical cancer. Does screening really reduce mortality?	BMJ	1999	No VIA
120	Adab R. et al	Screening and mortality from cervical cancer. Study shows importance of centralised organisation in screening.	BMJ	1999	No VIA
121	Lazcano-Ponce E.C. et al	Mortality from cervical carcinoma in Mexico: Impact of screening, 1980- 1990	ACTA CYTOL.	1996	No VIA
122	De Schryver A.	Does screening for cervical cancer affect incidence and mortality trends? The Belgian experience	EUR. J. CANCER CLIN. ONCOL.	1989	No VIA
123	Hakama M. et al	A screening programme for cervical cancer that worked.	Cancer Surv.	1988	No VIA
124	Van der Graaf Y. et al	Cervical cancer mortality in the Netherlands	INT. J. EPIDEMIOL.	1988	No VIA
125	Laara E. et al	Trends in mortality from cervical cancer in the Nordic countries: Association with organised screening programmes	LANCET	1987	No VIA
126	Kjellgren O.	Mass screening in Sweden for cancer of the uterine cervix: Effect on incidence and mortality. An overview	GYNECOL. OBSTET. INVEST.	1986	No VIA
127	Kuroishi T. et al	Evaluation of the efficacy of mass screening for uterine cancer in Japan	JPN. J. CANCER RES.	1986	No VIA
128	Takahashi K. et al	Studies of screening, detection and mortality rates in mass screening for	ACTA OBSTET.	1985	No VIA

S. No.	Author	Title	Journal	Year	Reason for exclusion
		uterine cervical cancer in Shimane Prefecture	GYNAECOL. JPN.		
129	Hakulinen T. et al	The effect of screening on the incidence and mortality of cervical cancer in Finland	NOWOTWORY	1985	No VIA
130	Miller E.R. et al	Impact of a federally funded cervical cancer screening program on reducing mortality in New Jersey.	Prog. Clin. Biol. Res.	1984	No VIA
131	JÃ³hannesson G. et al	Mass screening for cervical cancer in Iceland during 1965-1969 and the effect on incidence and mortality.	Cancer Detect. Prev.	1982	No VIA
132	Johannesson G. et al	Screening for cancer of the uterine cervix in Iceland 1965-1978	ACTA OBSTET. GYNECOL. SCAND.	1982	No VIA
133	Miller A.B. et al	The effect of hysterectomies and screening on mortality from cancer of the uterus in Canada	INT. J. CANCER	1981	No VIA
134	Mobius G. et al	Nine years screening for cervical cancer: Influence on incidence and mortality	CANCER CYTOL.	1978	No VIA
135	Christopherson W.M. et al	Trends in mortality from uterine cancer in relation to mass screening	ACTA CYTOL.	1977	No VIA
136	Kjellgren O.	Mass screening in Sweden for cancer of the uterine cervix. Results and epidemiologic effect	ACTA OBSTET. GYNECOL. SCAND.	1977	No VIA
137	Gad C.	Cervical carcinoma in Frederiksberg borough: The influence of population screening on mortality	DAN. MED. BULL.	1976	No VIA
138	Timonen S. et al	Mass screening for cervical carcinoma in Finland: organization and effect on morbidity and mortality	ANN. CHIR. GYNAECOL.	1974	No VIA
139	Pesola F et al	Impact of screening on cervical cancer incidence in England: a time trend analysis.	BMJ open	2019	modelling study
140	Bucchi D et al	Immigration, screening, and cervical cancer incidence: an application of Age-Period-Cohort analysis.	European journal of cancer prevention	2019	modelling study
141	Campos NG et al	Health impact of delayed implementation of cervical cancer screening programs in India: A modeling analysis.	International journal of cancer	2019	modelling study
142	Virani S et al	Effect of the national screening program on malignancy status of cervical cancer in Northern Thailand.	International journal of public health	2018	modelling study
143	Johnson HC et al	Effect of HPV vaccination and cervical cancer screening in England by ethnicity: a modelling study.	The Lancet. Public health	2018	modelling study
144	Nowakowski A et al	Trends in cervical cancer incidence and mortality in Poland: is there an impact of the introduction of the organised screening?	European journal of epidemiology	2017	modelling study
145	Olson B et al	Cervical cancer screening programs and guidelines in low- and middle-	International journal of	2016	review article

S. No.	Author	Title	Journal	Year	Reason for exclusion
		income countries.	gynaecology and obstetrics		
146	SeppÃ¤ K et al	Age-related incidence of cervical cancer supports two aetiological components: a population-based register study.	BJOG	2016	modelling study
147	Thulaseedharan JV et al	Risk of invasive cancer among women visually screened and colposcopy triaged by trained nurses in rural South India.	International journal of gynaecology and obstetrics	2015	Interim results
148		Reducing cervical cancer mortality in India.	Cancer discovery	2013	review article
149	Taylor RJ et al	Effects of screening on cervical cancer incidence and mortality in New South Wales implied by influences of period of diagnosis and birth cohort.	Journal of epidemiology and community health	2001	modelling study
150	Domgue J.F. et al	Is It Relevant to Keep Advocating Visual Inspection of the Cervix with Acetic Acid for Primary Cervical Cancer Screening in Limited-Resource Settings?	Obstet. Gynecol. Surv.	2019	review article
151	Sankaranarayanan R.	Screening for cancer in low- and middle-income countries	Ann. of Global Health	2014	review article
152	Shastri S.S. et al	Effect of VIA screening by primary health workers: Randomized controlled study in Mumbai, India	J. Natl. Cancer Inst.	2014	Conference presentation
153	Khozaim K. et al	Establishment of a cervical cancer screening and treatment program in Western Kenya	Int. J. Gynecol. Cancer	2012	no comparator group
154	Sankaranarayanan R. et al	Visual inspection methods for cervical cancer prevention	Best Pract. Res. Clin. Obstet. Gynaecol.	2012	review article
155	Ekwueme D.U. et al	Estimated effects of the national breast and cervical cancer early detection program on cervical cancer mortality	Value Health	2011	modelling study
156	Hoerger T.J. et al	Estimated effects of the national breast and cervical cancer early detection program on breast cancer mortality	Am. J. Prev. Med.	2011	modelling study
157	Parham G. et al	Effectiveness of a program to prevent cervical cancer among HIV-infected women in Zambia	Gynecol. Oncol.	2011	modelling study
158	Sankaranarayanan R.	What is the optimum screening method for cervical cancer in developing countries?	Ann. Oncol.	2010	review article
159	Mittra I. et al	A cluster randomized, controlled trial of breast and cervix cancer screening in Mumbai, India: Methodology and interim results after three rounds of screening	Int. J. Cancer	2010	Interim results
160	Sankaranarayanan R.	Cervical cancer screening methods in low resource settings	Int. J. Gynecol. Obstet.	2009	review article
161	Szarewski A.	Cervical screening by visual inspection with acetic acid	Lancet	2007	review article

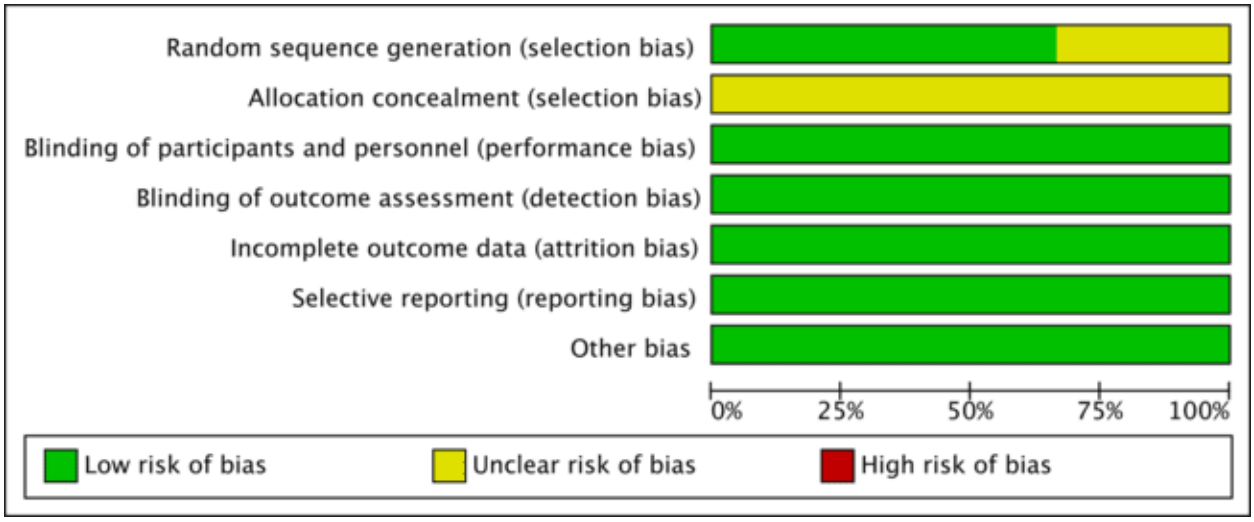
S. No.	Author	Title	Journal	Year	Reason for exclusion
162	Chumworathayi B. et al	VIA and cryotherapy: Doing what's best	J. Med. Assoc. Thailand	2006	review article
163	Sankaranarayanan R. et al	A cluster randomized controlled trial of visual, cytology and human papillomavirus screening for cancer of the cervix in rural India	Int. J. Cancer	2005	Interim results
164	Carr K.C. et al	Cervical cancer screening in low resource settings using visual inspection with acetic acid	J. Midwifery Women's Health	2004	review article
165	Sankaranarayanan R. et al	Initial results from a randomized trial of cervical visual screening in rural south India	Int. J. Cancer	2004	Interim results
166	Sankaranarayanan R. et al	Early detection of cervical cancer with visual inspection methods: A summary of completed and on-going studies in India	Salud Publica Mex.	2003	review article
167	Sankaranarayanan R.	Cervical cancer in developing countries	Trans. R. Soc. Trop. Med. Hyg.	2002	review article
168	Cullins V.E. et al	Cervical cancer prevention using visual screening methods	Reprod. Health Matters	1999	review article

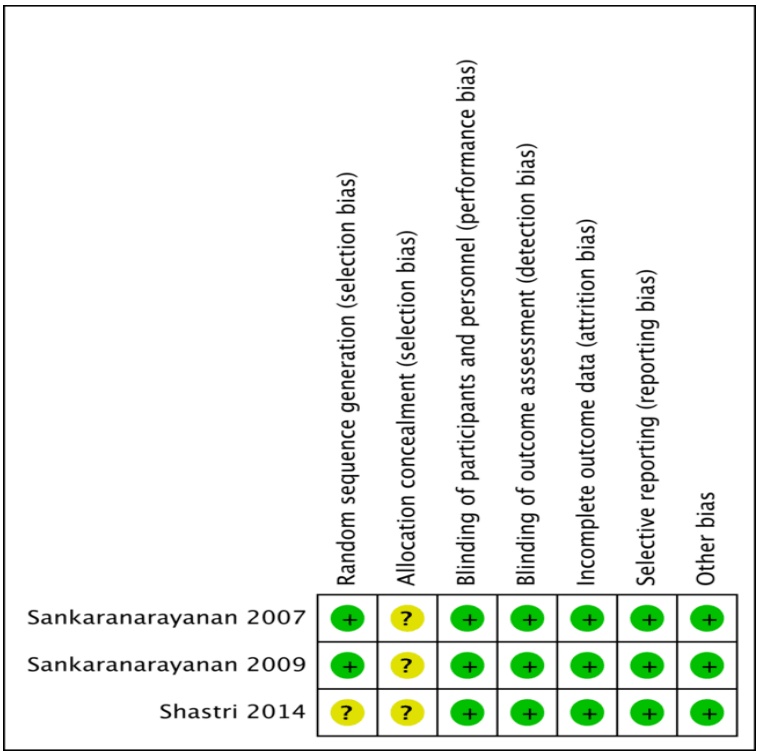
3. Table S2. Risk of bias (ROB) assessment for non-randomized study included in the review

Risk of bias assessment of non-randomized study using ROBINS-I tool (2016)

Domains	Chumworathayi 2010
Bias due to confounding	Serious risk of bias
Bias in selection of participants	Serious risk of bias
Bias in classification of interventions	Low risk of bias
Bias due to deviation from intended interventions	No information
Bias due to missing data	No information
Bias in measurement of outcomes	Low risk of bias
Bias in selection of the reported result	Moderate risk of bias

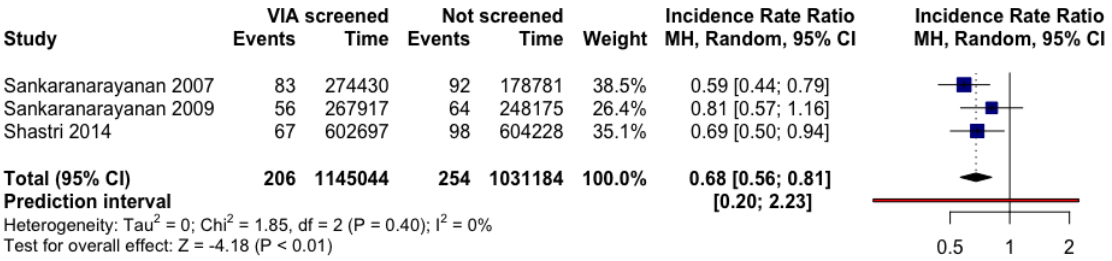
4. Figure S1. Risk of bias assessment of RCTs using Cochrane Collaboration's tool for assessing risk of bias



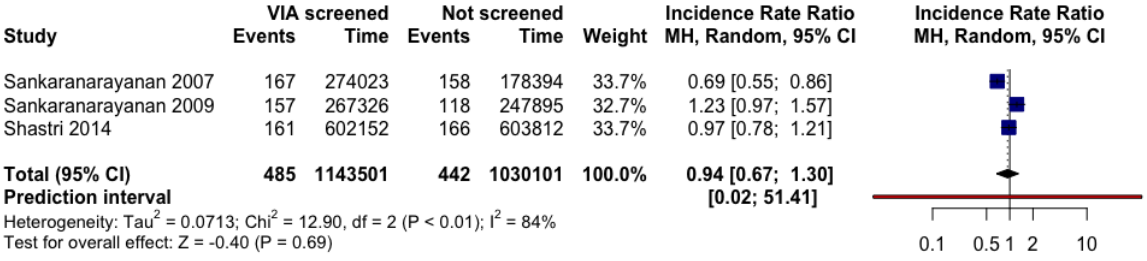


5. Figure S2. Forest plots for individual outcome

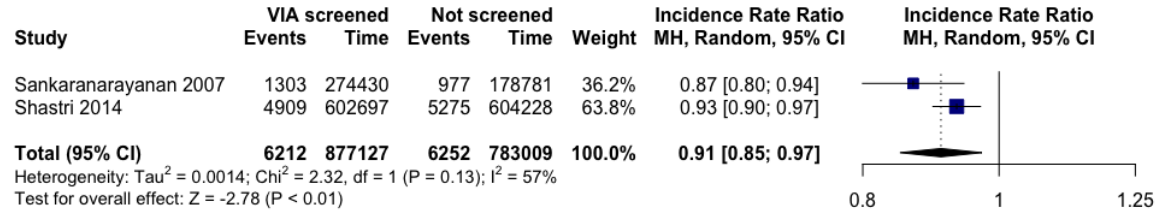
Cervical cancer mor tality



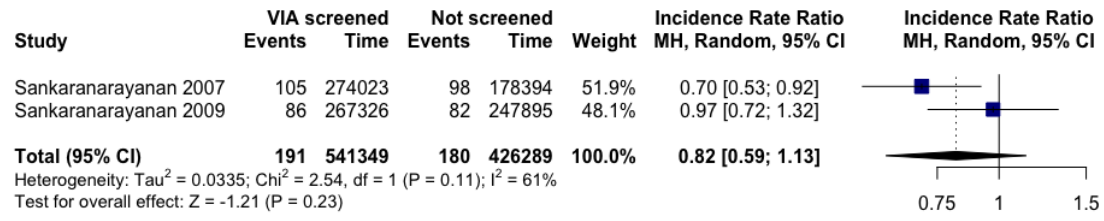
Incidence of invasive cervical cancer



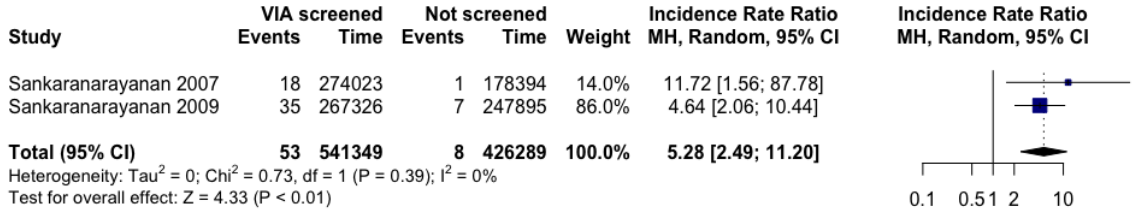
All-cause mortality



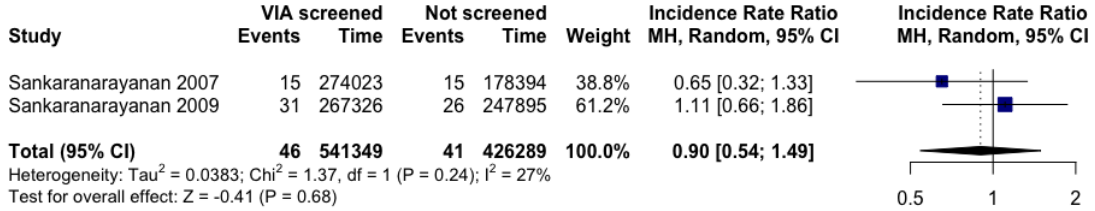
Incidence of >=stage 2 cervical cancer



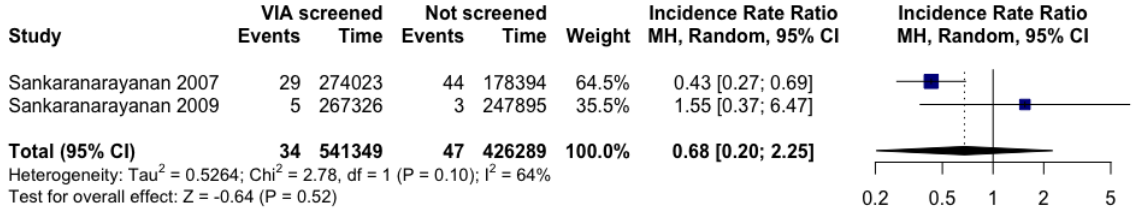
Incidence of stage IA cervical cancer



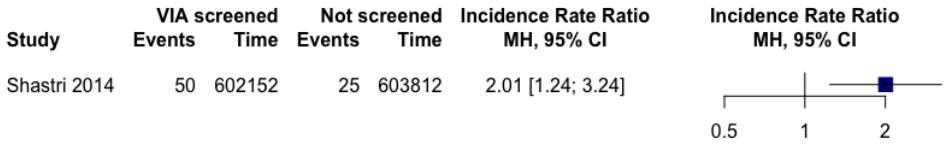
Incidence of stage IB cervical cancer



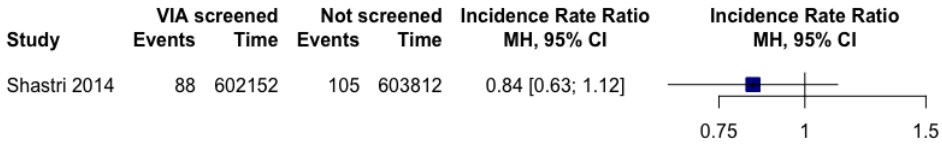
Incidence of unknown stage cervical cancer



Incidence of <stage IIB cervical cancer

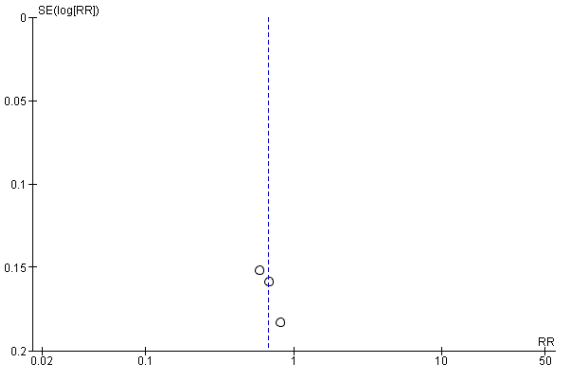


Incidence of >=stage IIB cervical cancer

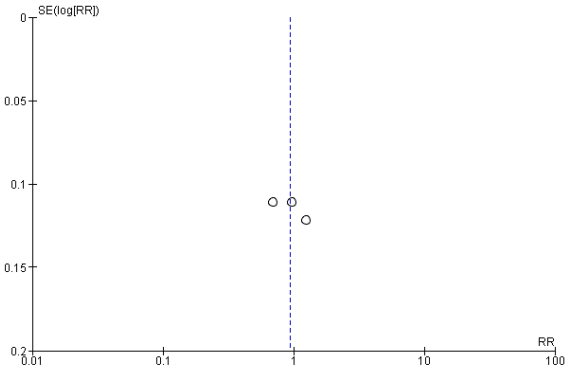


6. Figure S3. Funnel plots

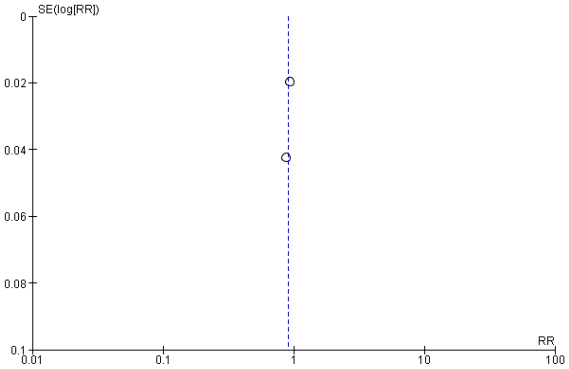
Cervical cancer mortality



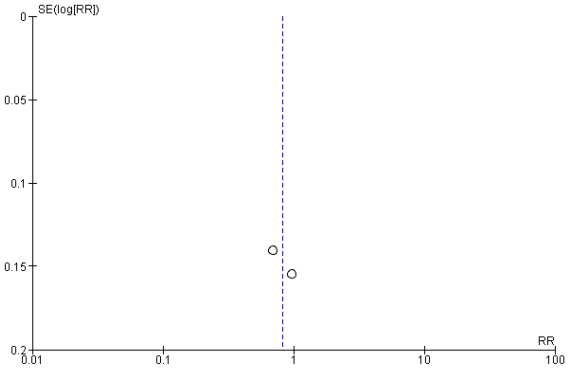
Incidence of invasive cervical cancer



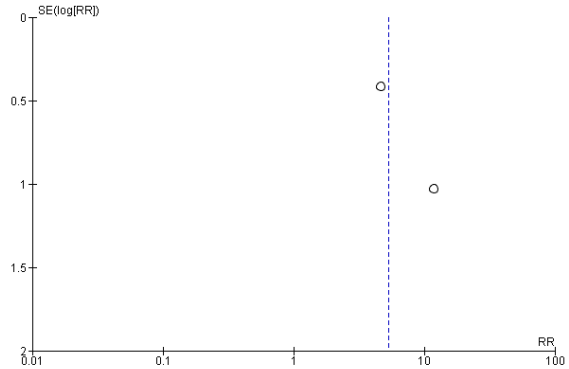
All-cause mortality



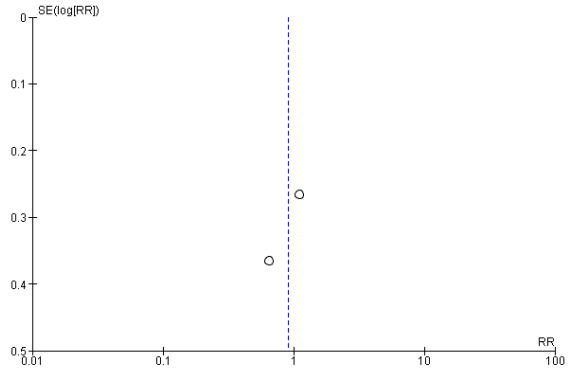
Incidence of >=stage II cervical cancer



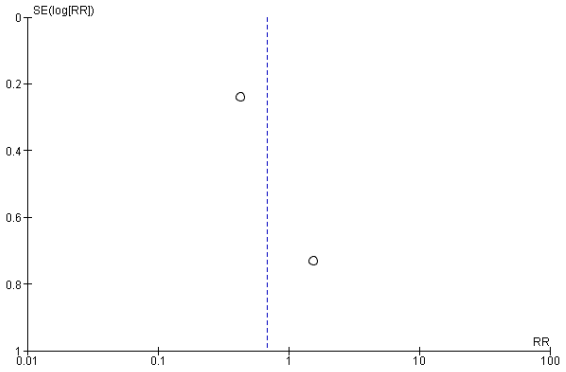
Incidence of stage IA cervical cancer



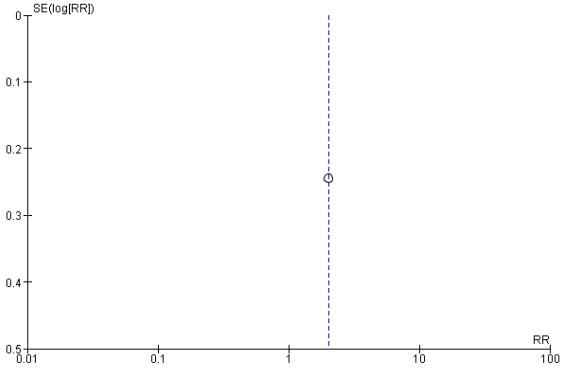
Incidence of IB cervical cancer



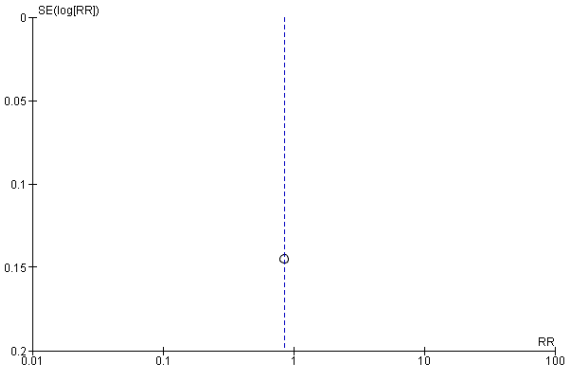
Incidence of unknown stage cervical cancer



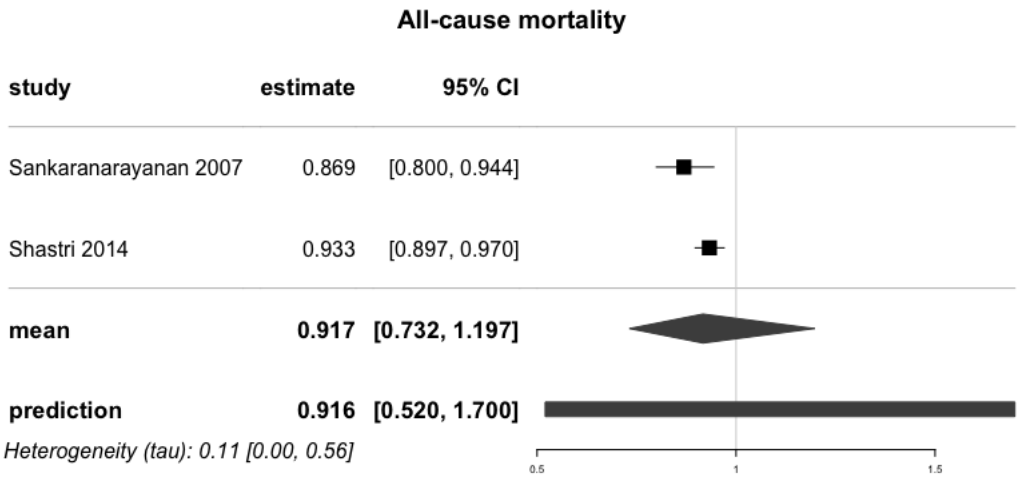
Incidence of <stage IIB cervical cancer

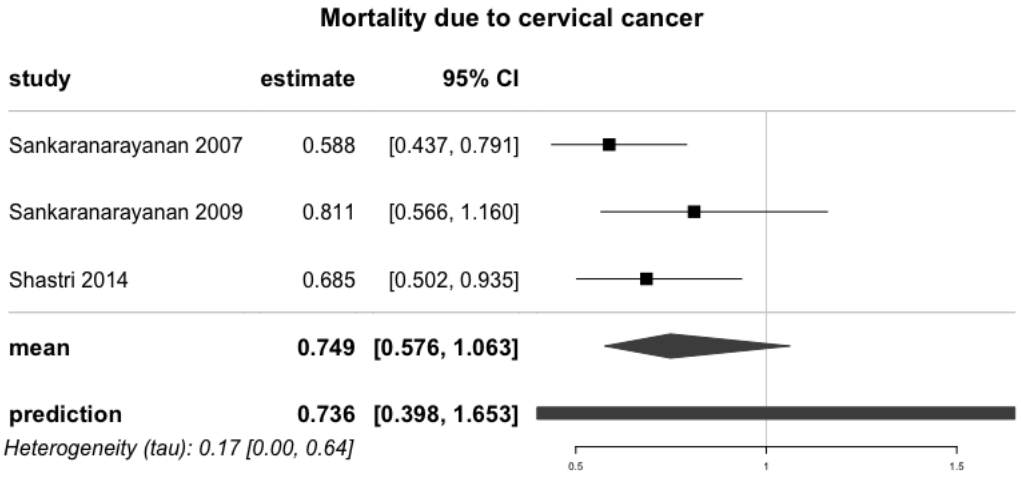


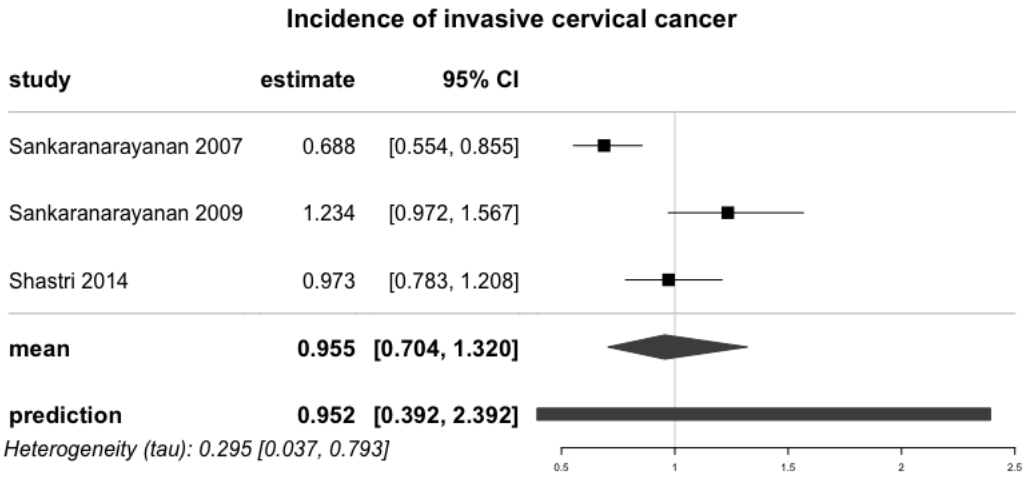
Incidence of >=stage IIB cervical cancer

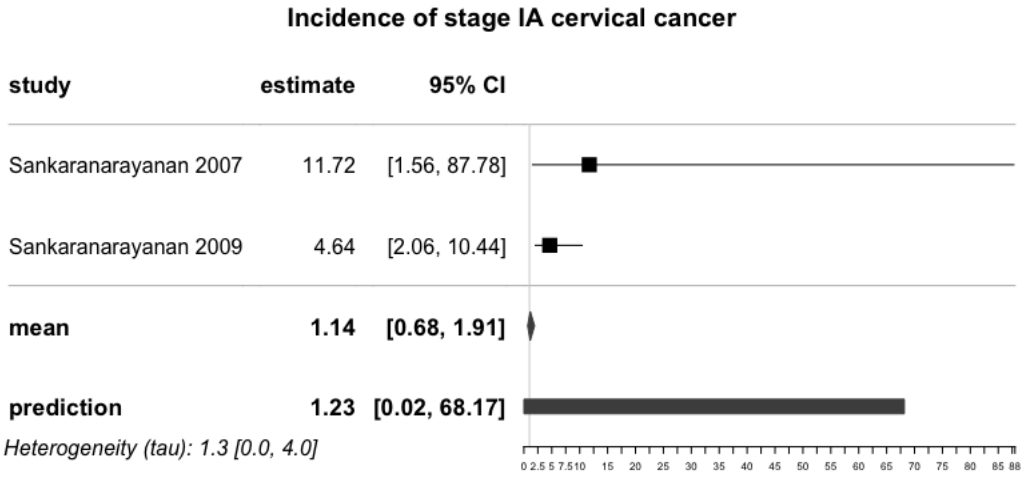


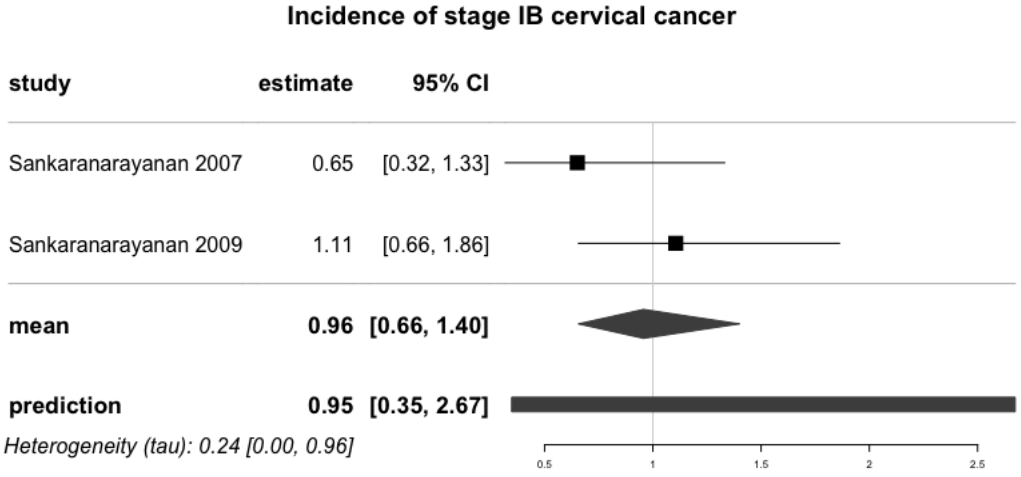
7. Figure S4. Results of Bayesian meta-analysis

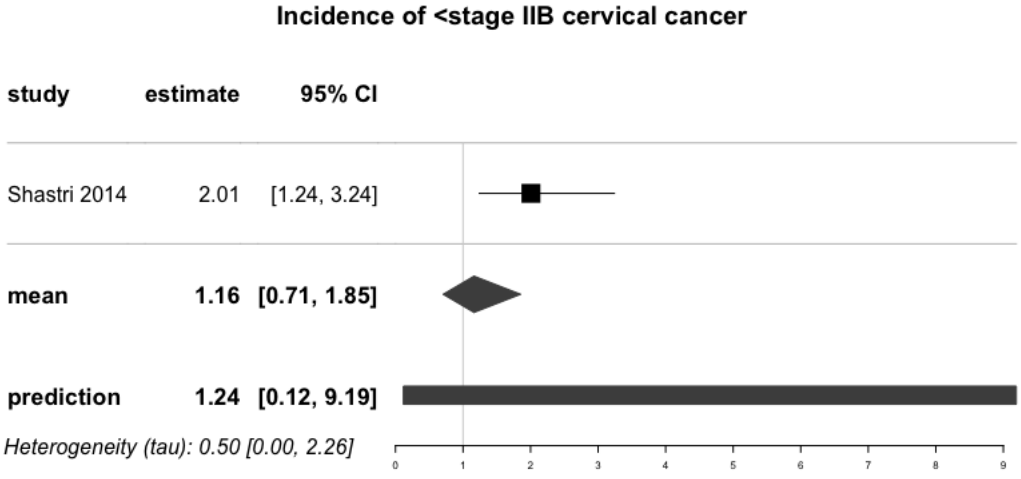


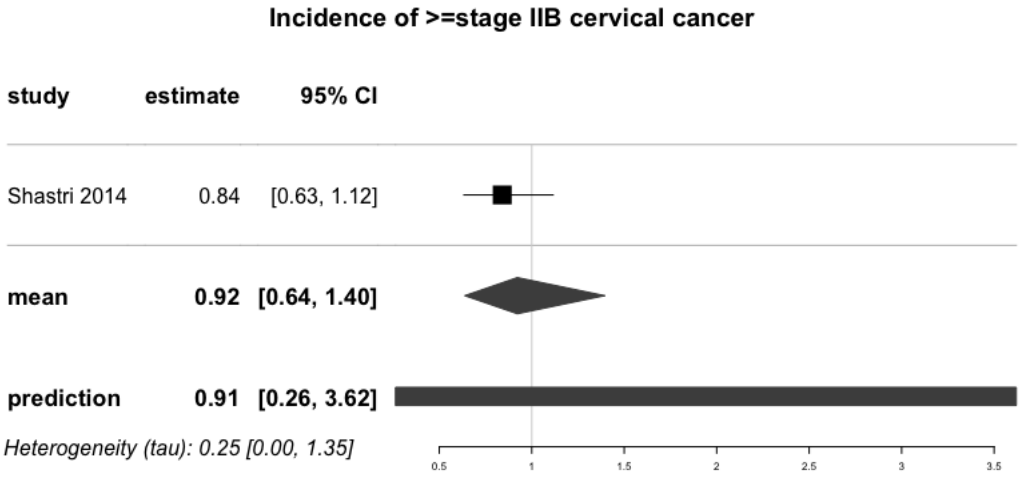


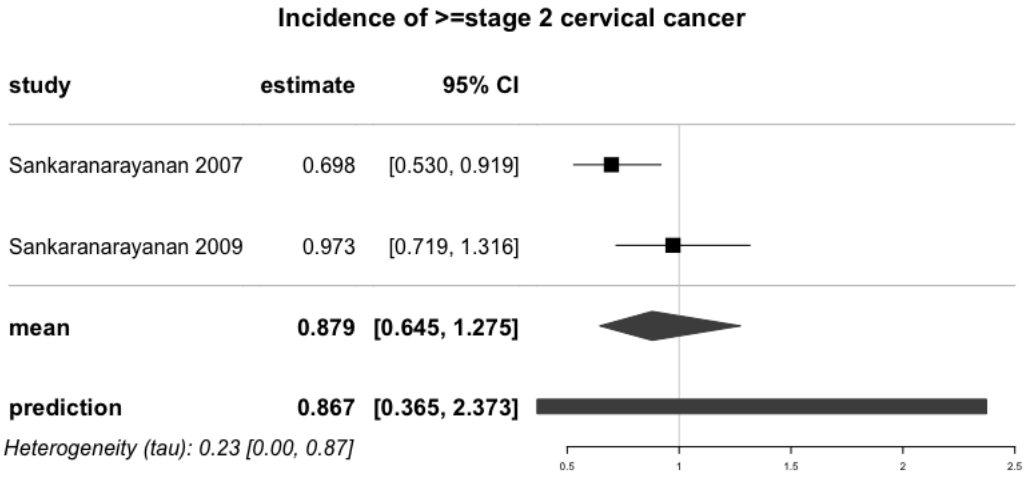


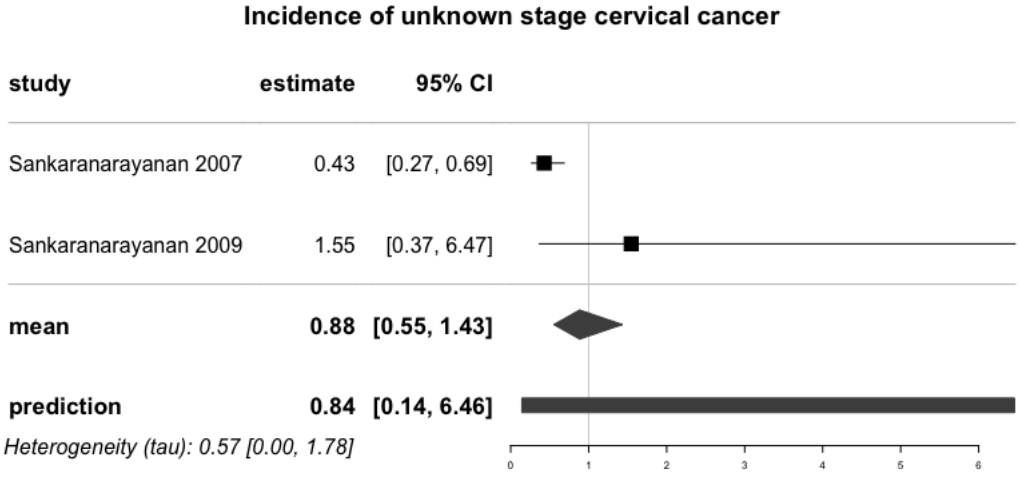

Incidence of stage IA cervical cancer
study
estimate
95% CI
Sankaranarayanan 2007 11.72 [1.56, 87.78]
Sankaranarayanan 2009 4.64 [2.06, 10.44]
mean 1.14 [0.68, 1.91]
prediction 1.23 [0.02, 68.17]
Heterogeneity (tau): 1.3 [0.0, 4.0]
0 2.5 5 7.5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 88


Incidence of stage IB cervical cancer
study
estimate
95% CI
Sankaranarayanan 2007 0.65 [0.32, 1.33]
Sankaranarayanan 2009 1.11 [0.66, 1.86]
mean 0.96 [0.66, 1.40]
prediction 0.95 [0.35, 2.67]
Heterogeneity (tau): 0.24 [0.00, 0.96]
0.5 1 1.5 2 2.5


Incidence of <stage IIB cervical cancer
study
estimate
95% CI
Shastri 2014 2.01 [1.24, 3.24]
mean 1.16 [0.71, 1.85]
prediction 1.24 [0.12, 9.19]
Heterogeneity (tau): 0.50 [0.00, 2.26]
0 1 2 3 4 5 6 7 8 9


Incidence of >=stage IIB cervical cancer
study
estimate
95% CI
Shastri 2014 0.84 [0.63, 1.12]
mean 0.92 [0.64, 1.40]
prediction 0.91 [0.26, 3.62]
Heterogeneity (tau): 0.25 [0.00, 1.35]
0.5
1
1.5
2
2.5
3
3.5


Incidence of >=stage 2 cervical cancer
study
estimate
95% CI
Sankaranarayanan 2007 0.698 [0.530, 0.919]
Sankaranarayanan 2009 0.973 [0.719, 1.316]
mean 0.879 [0.645, 1.275]
prediction 0.867 [0.365, 2.373]
Heterogeneity (tau): 0.23 [0.00, 0.87]
0.5
1
1.5
2
2.5


Incidence of unknown stage cervical cancer
study
estimate
95% CI
Sankaranarayanan 2007 0.43 [0.27, 0.69]
Sankaranarayanan 2009 1.55 [0.37, 6.47]
mean 0.88 [0.55, 1.43]
prediction 0.84 [0.14, 6.46]
Heterogeneity (tau): 0.57 [0.00, 1.78]
0
1
2
3
4
5
6