Simulation Result 1: C~Exp(0.2)

Yi

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Biomarker1; EXP(0.2)

Biomarker2; EXP(0.2)

Biomarker3; EXP(0.2)

Biomarker1; U(1,4)

Biomarker2; U(1,4)

Biomarker3; U(1,4)

Table 1: Summary of the estimated SAUC for Biomarker1 when the true censoring is distributed as $Exp(0.2)$.

Patients	N	Method	$p = 0.7$ Median (Q1, Q3)	$p = 0.5$ Median (Q1, Q3)	$p = 0.3$ Median (Q1, Q3)
50-150	20	Proposed	75.63 (73.32, 77.87)	74.75 (72.28, 76.89)	73.58 (71.26, 76.68)
		BNM_P	75.01 (73.32, 76.39)	74.82 (73.58, 75.97)	74.66 (73.69, 75.65)
		BNM_O	76.11 (74.26, 78.11)	76.55 (74.56, 78.29)	77.30 (75.17, 79.30)
		Succuess	99.6	99.3	98
	30	Proposed	75.15 (73.42, 77.04)	74.71 (72.67, 76.58)	73.88 (71.90, 76.18)
		BNM_P	74.82 (73.56, 75.96)	74.79 (73.60, 75.73)	74.56 (73.83, 75.42)
		BNM_O	75.93 (74.40, 77.38)	76.50 (74.81, 77.92)	77.16 (75.65, 78.68)
		Succuess	100	99.6	98.9
	50	Proposed	75.01 (73.49, 76.46)	74.36 (72.73, 75.94)	73.89 (72.18, 75.86)
		BNM_P	74.61 (73.66, 75.57)	74.59 (73.74, 75.33)	74.46 (73.86, 75.17)
		BNM_O	75.71 (74.52, 76.89)	76.10 (74.89, 77.24)	76.90 (75.72, 78.07)
		Succuess	99.9	99.9	99
50-300	20	Proposed	76.12 (73.50, 78.06)	75.61 (72.76, 77.94)	74.06 (70.53, 76.67)
		BNM_P	75.95 (74.80, 77.04)	75.84 (74.90, 76.82)	75.73 (74.91, 76.48)
		BNM_O	76.89 (75.28, 78.27)	77.37 (75.88, 78.84)	78.20 (76.41, 79.80)
		Succuess	99.6	98.6	67.4
	30	Proposed	75.93 (74.22, 77.53)	75.50 (73.53, 77.29)	74.13 (71.41, 76.47)
		BNM_P	75.77 (74.84, 76.70)	75.91 (75.01, 76.64)	75.64 (75.07, 76.30)
		BNM_O	76.60 (75.47, 77.85)	77.23 (75.80, 78.62)	77.73 (76.37, 79.02)
		Succuess	99.6	99.3	69.4
	50	Proposed	76.00 (74.75, 77.21)	75.71 (74.18, 76.92)	74.80 (72.91, 76.39)
		BNM_P	75.83 (75.05, 76.46)	75.69 (75.04, 76.38)	75.60 (75.10, 76.09)
		BNM_O	76.47 (75.55, 77.48)	76.89 (75.90, 77.86)	77.51 (76.32, 78.49)
		Succuess	100	99.7	75.9

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Proposed denotes the proposed sensitivity analysis method; BNM_P denotes the HZ model using the population (published and unpublished) studies; BNM_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of convergence among 1000 repetition All the entries are multiplied by 100.

Table 2: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $Exp(0.2)$.

Patients	N	Method	$p = 0.7$ Median (Q1, Q3)	$p = 0.5$ Median (Q1, Q3)	$p = 0.3$ Median (Q1, Q3)
50-150	20	Proposed	59.89 (58.26, 61.40)	59.06 (57.25, 61.22)	58.37 (56.22, 61.66)
		BNM_P	60.11 (59.08, 61.15)	60.17 (59.22, 61.03)	60.16 (59.46, 60.74)
		BNM_O	61.12 (59.71, 62.33)	61.97 (60.64, 63.44)	63.30 (61.72, 64.97)
		Succuess	99.1	98.9	99.3
	30	Proposed	59.60 (58.40, 61.07)	58.66 (57.33, 60.50)	58.00 (56.19, 60.39)
		BNM_P	60.09 (59.31, 60.95)	60.13 (59.44, 60.80)	60.06 (59.53, 60.60)
		BNM_O	61.02 (60.01, 62.14)	62.05 (60.98, 63.13)	63.35 (62.15, 64.66)
		Succuess	99.6	99.6	99.7
	50	Proposed	59.51 (58.66, 60.46)	58.47 (57.48, 59.53)	57.36 (56.11, 58.77)
		BNM_P	60.09 (59.44, 60.78)	60.04 (59.50, 60.65)	60.08 (59.63, 60.46)
		BNM_O	61.08 (60.25, 61.87)	62.03 (61.12, 62.86)	63.23 (62.22, 64.18)
		Succuess	100	100	99.9
50-300	20	Proposed	60.30 (58.98, 61.50)	60.13 (58.70, 61.75)	59.89 (58.17, 61.89)
		BNM_P	60.29 (59.53, 61.07)	60.37 (59.65, 60.96)	60.38 (59.88, 60.87)
		BNM_O	61.24 (60.30, 62.26)	62.09 (61.07, 63.17)	63.24 (62.13, 64.33)
		Succuess	97.3	96.2	97.4
	30	Proposed	60.06 (59.02, 61.18)	59.81 (58.64, 61.37)	59.73 (58.22, 61.66)
		BNM_P	60.26 (59.71, 60.91)	60.34 (59.76, 60.88)	60.35 (59.96, 60.72)
		BNM_O	61.30 (60.52, 62.07)	62.11 (61.33, 62.99)	63.19 (62.31, 64.05)
		Succuess	97.7	97.6	98.3
	50	Proposed	59.97 (59.25, 60.85)	59.64 (58.72, 60.84)	59.29 (58.21, 60.92)
		BNM_P	60.33 (59.85, 60.84)	60.33 (59.90, 60.72)	60.30 (59.99, 60.60)
		BNM_O	61.29 (60.75, 61.88)	62.11 (61.47, 62.77)	63.12 (62.41, 63.84)
		Succuess	99	99	99.8

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Proposed denotes the proposed sensitivity analysis method; BNM_P denotes the HZ model using the population (published and unpublished) studies; BNM_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of convergence among 1000 repetition All the entries are multiplied by 100.

Table 3: Summary of the estimated SAUC for Biomarker3 when the true censoring is distributed as $Exp(0.2)$.

Patients	N	Method	$p = 0.7$ Median (Q1, Q3)	$p = 0.5$ Median (Q1, Q3)	$p = 0.3$ Median (Q1, Q3)
50-150	20	Proposed	83.40 (80.78, 86.32)	82.37 (79.72, 85.20)	82.13 (78.84, 85.28)
		BNM_P	83.33 (81.21, 85.42)	83.26 (81.52, 85.00)	83.30 (81.93, 84.63)
		BNM_O	83.88 (81.42, 86.14)	84.20 (82.04, 86.34)	84.71 (82.90, 86.67)
		Succuess	95	95.6	74.1
	30	Proposed	83.74 (81.56, 85.75)	82.89 (80.76, 85.38)	82.19 (80.01, 84.90)
		BNM_P	83.26 (81.74, 84.96)	83.12 (81.60, 84.65)	83.15 (81.97, 84.35)
		BNM_O	83.90 (82.07, 85.57)	83.97 (82.13, 85.75)	84.63 (82.98, 86.04)
		Succuess	97.6	97.2	74.6
	50	Proposed	83.75 (82.14, 85.51)	83.59 (81.55, 85.55)	82.99 (80.75, 85.27)
		BNM_P	83.09 (81.80, 84.39)	83.08 (81.99, 84.26)	82.96 (82.07, 83.94)
		BNM_O	83.71 (82.24, 84.99)	84.10 (82.77, 85.32)	84.51 (83.15, 85.80)
		Succuess	98.9	98	84.5
50-300	20	Proposed	82.80 (79.80, 85.24)	81.51 (78.77, 84.55)	79.73 (75.55, 83.08)
		BNM_P	84.16 (82.66, 85.65)	83.93 (82.73, 85.17)	83.92 (82.78, 84.89)
		BNM_O	84.40 (82.83, 86.00)	84.46 (82.88, 85.97)	84.87 (83.43, 86.29)
		Succuess	91.2	74.9	51.2
	30	Proposed	83.15 (81.09, 85.13)	82.78 (80.10, 84.72)	80.65 (76.05, 83.88)
		BNM_P	83.92 (82.71, 85.26)	83.85 (82.68, 84.91)	83.81 (83.12, 84.80)
		BNM_O	84.11 (82.80, 85.44)	84.19 (82.96, 85.43)	84.73 (83.56, 85.90)
		Succuess	93.6	72.4	49.8
	50	Proposed	83.78 (82.21, 85.26)	83.36 (81.84, 84.83)	82.13 (77.67, 84.26)
		BNM_P	83.88 (82.84, 84.81)	83.85 (82.87, 84.73)	83.78 (83.09, 84.59)
		BNM_O	83.97 (82.93, 84.95)	84.15 (83.15, 85.03)	84.50 (83.62, 85.49)
		Succuess	95.3	80.3	52.9

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Proposed denotes the proposed sensitivity analysis method; BNM_P denotes the HZ model using the population (published and unpublished) studies; BNM_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of convergence among 1000 repetition All the entries are multiplied by 100.

Table 4: Summary of the estimated SAUC for Biomarker1 when the true censoring is distributed as $U(1,4)$, but a misspecified exponential distribution is fitted.

Patients	N	Method	$p = 0.7$ Median (Q1, Q3)	$p = 0.5$ Median (Q1, Q3)	$p = 0.3$ Median (Q1, Q3)
50-150	20	Proposed	76.18 (74.04, 78.41)	75.47 (72.89, 78.00)	73.96 (71.54, 76.67)
		BNM_P	75.33 (73.88, 76.73)	75.05 (73.80, 76.42)	74.97 (74.00, 75.85)
		BNM_O	76.37 (74.46, 78.02)	76.84 (74.98, 78.96)	77.60 (75.86, 79.43)
		Succuess	99.8	99.5	97.4
	30	Proposed	76.11 (74.18, 78.32)	75.14 (73.18, 77.23)	73.62 (71.59, 75.69)
		BNM_P	75.05 (73.86, 76.22)	74.92 (73.95, 75.90)	74.84 (74.13, 75.58)
		BNM_O	76.27 (74.76, 77.70)	76.65 (75.18, 78.06)	77.25 (75.83, 78.70)
		Succuess	99.9	99.7	98.6
	50	Proposed	75.90 (74.43, 77.45)	74.94 (73.30, 76.72)	73.59 (71.92, 75.35)
		BNM_P	75.00 (73.99, 75.83)	74.84 (74.09, 75.52)	74.77 (74.16, 75.29)
		BNM_O	75.97 (74.90, 77.10)	76.39 (75.39, 77.48)	77.08 (75.83, 78.20)
		Succuess	100	99.8	99.1
50-300	20	Proposed	77.31 (74.09, 80.12)	76.36 (73.21, 79.34)	75.12 (71.20, 77.28)
		BNM_P	76.13 (75.11, 77.20)	76.12 (75.11, 77.07)	76.05 (75.30, 76.87)
		BNM_O	77.21 (75.63, 78.55)	77.63 (75.98, 79.03)	78.50 (76.91, 79.89)
		Succuess	99.6	93.4	65.1
	30	Proposed	76.69 (74.46, 79.06)	76.06 (73.49, 78.52)	74.89 (71.70, 76.88)
		BNM_P	76.02 (75.11, 76.93)	76.05 (75.24, 76.90)	75.87 (75.27, 76.50)
		BNM_O	76.97 (75.60, 78.11)	77.45 (75.93, 78.73)	78.21 (76.70, 79.52)
		Succuess	99.8	95.3	70.5
	50	Proposed	76.49 (74.79, 78.21)	75.69 (73.95, 77.57)	74.33 (72.37, 76.45)
		BNM_P	75.99 (75.21, 76.68)	75.83 (75.21, 76.46)	75.81 (75.39, 76.26)
		BNM_O	76.65 (75.79, 77.73)	77.06 (76.14, 78.02)	77.66 (76.71, 78.89)
		Succuess	99.9	96.7	65.7

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Proposed denotes the proposed sensitivity analysis method; BNM_P denotes the HZ model using the population (published and unpublished) studies; BNM_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of convergence among 1000 repetition All the entries are multiplied by 100.

Table 5: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $U(1, 4)$, but a misspecified exponential distribution is fitted.

Patients	N	Method	$p = 0.7$ Median (Q1, Q3)	$p = 0.5$ Median (Q1, Q3)	$p = 0.3$ Median (Q1, Q3)
50-150	20	Proposed	60.33 (58.73, 62.03)	59.87 (58.03, 61.87)	59.19 (57.33, 61.42)
		BNM_P	60.23 (59.21, 61.22)	60.19 (59.41, 60.98)	60.26 (59.60, 60.81)
		BNM_O	61.64 (60.24, 62.94)	62.79 (61.38, 64.09)	64.40 (62.88, 65.77)
		Succuess	99.1	99.7	99.5
	30	Proposed	60.15 (58.83, 61.45)	59.55 (57.99, 61.07)	58.79 (57.33, 60.52)
		BNM_P	60.19 (59.37, 61.01)	60.16 (59.52, 60.78)	60.17 (59.65, 60.69)
		BNM_O	61.60 (60.56, 62.62)	62.70 (61.59, 63.75)	64.28 (63.02, 65.44)
		Succuess	99.8	100	99.9
	50	Proposed	59.84 (58.96, 60.88)	59.16 (58.16, 60.18)	58.52 (57.28, 59.77)
		BNM_P	60.14 (59.57, 60.77)	60.23 (59.67, 60.73)	60.19 (59.80, 60.58)
		BNM_O	61.50 (60.76, 62.30)	62.70 (61.91, 63.55)	64.25 (63.34, 65.06)
		Succuess	99.8	99.9	99.8
50-300	20	Proposed	60.73 (59.48, 61.98)	60.75 (59.43, 61.94)	60.37 (58.95, 61.88)
		BNM_P	60.41 (59.60, 61.14)	60.37 (59.77, 61.03)	60.37 (59.89, 60.82)
		BNM_O	61.70 (60.72, 62.67)	62.63 (61.71, 63.58)	63.70 (62.72, 64.66)
		Succuess	99.2	98.8	99.4
	30	Proposed	60.54 (59.60, 61.60)	60.42 (59.27, 61.47)	60.03 (58.85, 61.19)
		BNM_P	60.35 (59.77, 61.06)	60.34 (59.81, 60.89)	60.36 (59.99, 60.74)
		BNM_O	61.65 (60.81, 62.45)	62.59 (61.73, 63.34)	63.64 (62.81, 64.45)
		Succuess	99.7	99.4	100
	50	Proposed	60.45 (59.66, 61.33)	60.25 (59.43, 61.10)	59.92 (58.88, 60.90)
		BNM_P	60.39 (59.92, 60.83)	60.42 (60.00, 60.80)	60.39 (60.06, 60.69)
		BNM_O	61.64 (61.06, 62.27)	62.59 (61.98, 63.16)	63.70 (63.06, 64.37)
		Succuess	99.7	99.5	99.8

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Proposed denotes the proposed sensitivity analysis method; BNM_P denotes the HZ model using the population (published and unpublished) studies; BNM_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of convergence among 1000 repetition All the entries are multiplied by 100.

Table 6: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $U(1,4)$, but a misspecified exponential distribution is fitted.

Patients	N	Method	$p = 0.7$ Median (Q1, Q3)	$p = 0.5$ Median (Q1, Q3)	$p = 0.3$ Median (Q1, Q3)
50-150	20	Proposed	82.00 (79.03, 84.55)	81.24 (78.58, 83.72)	81.17 (78.92, 83.64)
		BNM$_P$	78.85 (75.80, 81.47)	78.38 (75.84, 81.06)	78.72 (76.83, 80.43)
		BNM$_O$	79.59 (76.29, 82.59)	79.78 (76.33, 82.84)	81.63 (79.06, 84.17)
		Succuess	98.7	94.5	44.7
	30	Proposed	81.69 (79.85, 84.01)	81.44 (79.43, 83.28)	81.11 (79.26, 83.42)
		BNM$_P$	78.32 (75.81, 80.55)	78.33 (76.25, 80.21)	78.39 (76.97, 79.78)
		BNM$_O$	78.98 (76.49, 81.70)	79.71 (77.06, 82.01)	80.60 (78.47, 83.01)
		Succuess	99.6	96.2	43.9
	50	Proposed	81.92 (80.36, 83.60)	81.50 (80.03, 82.94)	81.23 (79.65, 82.67)
		BNM$_P$	78.21 (76.41, 80.11)	78.17 (76.58, 79.68)	78.16 (77.06, 79.42)
		BNM$_O$	79.36 (77.29, 81.18)	79.74 (77.68, 81.58)	80.59 (78.52, 82.38)
		Succuess	99.5	97.9	49.6
50-300	20	Proposed	80.61 (73.57, 84.99)	79.55 (54.92, 83.69)	72.00 (50.61, 81.89)
		BNM$_P$	80.43 (77.97, 82.96)	80.39 (78.46, 82.25)	80.66 (78.77, 81.91)
		BNM$_O$	81.22 (78.42, 84.61)	82.09 (79.71, 84.98)	83.61 (80.75, 87.10)
		Succuess	76.2	47.9	27.1
	30	Proposed	80.95 (72.52, 84.38)	80.36 (55.38, 84.48)	66.72 (47.79, 80.50)
		BNM$_P$	79.95 (78.04, 81.87)	80.19 (78.68, 81.83)	79.85 (78.59, 81.05)
		BNM$_O$	80.58 (78.53, 82.91)	81.53 (79.61, 83.81)	82.31 (80.60, 84.37)
		Succuess	79.6	53.1	24.5
	50	Proposed	80.91 (78.47, 83.49)	80.77 (71.23, 83.79)	78.61 (47.31, 82.66)
		BNM$_P$	79.65 (78.30, 81.18)	79.73 (78.43, 80.82)	79.80 (78.79, 80.96)
		BNM$_O$	80.23 (78.67, 81.99)	80.71 (79.17, 82.20)	81.87 (80.29, 83.68)
		Succuess	86	58.9	20.5

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Proposed denotes the proposed sensitivity analysis method; BNM$_P$ denotes the HZ model using the population (published and unpublished) studies; BNM$_O$ denotes the HZ model using only the observed (published) studies. CR denotes the proportion of convergence among 1000 repetition All the entries are multiplied by 100.