Simulation Result 1: C~Exp(0.2)

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2023-02-05

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)	CR	$p = 0.5$ Median (Q1, Q3)	CR	$p = 0.3$ Median (Q1, Q3)	CR
50-150	20	HZ$_P$	0.00 (73.30, 76.59)	100.00	0.00 (73.18, 76.16)	100.00	0.00 (73.60, 75.84)	100.00
		HZ$_O$	0.70 (73.87, 77.85)	100.00	1.59 (74.32, 78.10)	99.90	2.03 (74.92, 78.84)	100.00
		Prop	0.45 (73.20, 78.04)	64.52	0.57 (72.82, 77.52)	60.76	-0.21 (71.98, 77.46)	59.62
	30	HZ$_P$	0.00 (73.49, 76.11)	100.00	0.00 (73.50, 75.74)	100.00	0.00 (73.75, 75.56)	100.00
		HZ$_O$	0.77 (74.15, 76.99)	100.00	1.45 (74.39, 77.54)	100.00	2.18 (75.01, 78.17)	100.00
		Prop	0.59 (73.68, 77.23)	74.75	0.60 (73.12, 77.03)	73.35	-0.27 (72.34, 76.80)	69.74
	50	HZ$_P$	0.00 (73.62, 75.57)	100.00	0.00 (73.65, 75.44)	100.00	0.00 (73.70, 75.26)	100.00
		HZ$_O$	0.78 (74.27, 76.47)	100.00	1.32 (74.80, 77.13)	100.00	2.00 (75.34, 77.76)	100.00
		Prop	0.60 (73.87, 76.78)	81.60	0.31 (73.30, 76.55)	80.50	-0.12 (72.73, 76.31)	76.95
50-300	20	HZ$_P$	0.00 (74.64, 77.30)	100.00	0.00 (74.74, 76.94)	100.00	0.00 (74.86, 76.71)	100.00
		HZ$_O$	0.66 (75.27, 78.11)	100.00	1.15 (75.51, 78.63)	100.00	1.90 (75.82, 79.10)	100.00
		Prop	0.02 (73.60, 77.86)	59.64	-0.40 (72.51, 77.55)	58.25	-0.83 (64.91, 77.35)	51.54
	30	HZ$_P$	0.00 (74.75, 76.88)	100.00	0.00 (74.86, 76.62)	100.00	0.00 (74.98, 76.47)	100.00
		HZ$_O$	0.43 (75.20, 77.61)	100.00	1.09 (75.60, 78.04)	100.00	1.55 (76.04, 78.73)	100.00
		Prop	-0.04 (74.30, 77.22)	70.70	-0.09 (73.88, 77.22)	65.73	-0.32 (72.89, 77.28)	59.45
	50	HZ$_P$	0.00 (74.97, 76.44)	100.00	0.00 (74.98, 76.32)	100.00	0.00 (75.06, 76.16)	100.00
		HZ$_O$	0.55 (75.34, 77.14)	100.00	0.98 (75.66, 77.61)	100.00	1.56 (76.03, 78.19)	100.00
		Prop	0.28 (74.93, 77.12)	78.60	0.13 (74.51, 76.94)	75.90	-0.02 (74.03, 76.88)	62.72

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denotes the proposed sensitivity analysis method; BNM$_P$ denotes the HZ model using the population (published and unpublished) studies; BNM$_O$ denotes the HZ model using only the observed (published) studies.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)	CR	$p = 0.5$ Median (Q1, Q3)	CR	$p = 0.3$ Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (58.99, 61.25)	100.00	0.00 (59.20, 61.07)	100.00	0.00 (59.38, 60.92)	100.00
		HZ_O	0.58 (59.28, 61.98)	100.00	1.47 (60.23, 62.90)	99.80	2.72 (61.47, 64.36)	99.90
		Prop	0.28 (58.94, 61.71)	70.17	-0.62 (57.91, 61.43)	67.61	-0.85 (57.20, 62.70)	68.85
	30	HZ_P	0.00 (59.20, 60.95)	100.00	0.00 (59.33, 60.84)	100.00	0.00 (59.42, 60.72)	100.00
		HZ_O	0.61 (59.60, 61.68)	100.00	1.43 (60.47, 62.55)	100.00	2.61 (61.50, 63.82)	100.00
		Prop	0.03 (58.91, 61.28)	74.19	-0.86 (58.03, 60.57)	73.05	-1.78 (56.75, 60.44)	76.18
	50	HZ_P	0.00 (59.33, 60.75)	99.90	0.00 (59.45, 60.65)	100.00	0.00 (59.56, 60.56)	100.00
		HZ_O	0.61 (59.86, 61.44)	100.00	1.50 (60.64, 62.34)	100.00	2.47 (61.73, 63.48)	100.00
		Prop	0.06 (59.21, 61.00)	82.49	-1.00 (58.10, 60.04)	79.16	-2.01 (56.94, 59.42)	82.87
50-300	20	HZ_P	0.00 (59.53, 61.26)	100.00	0.00 (59.55, 61.16)	99.89	0.00 (59.77, 60.97)	100.00
		HZ_O	0.56 (60.06, 62.00)	99.90	1.38 (60.62, 62.79)	99.89	2.34 (61.68, 63.77)	99.58
		Prop	0.15 (59.34, 61.66)	60.75	0.16 (58.95, 62.24)	61.87	0.13 (58.64, 62.69)	64.52
	30	HZ_P	0.00 (59.68, 61.03)	100.00	0.00 (59.74, 60.92)	100.00	0.00 (59.87, 60.81)	100.00
		HZ_O	0.52 (60.18, 61.74)	100.00	1.38 (60.85, 62.51)	100.00	2.34 (61.85, 63.52)	100.00
		Prop	-0.04 (59.35, 61.43)	67.56	-0.28 (58.87, 61.51)	68.61	-0.33 (58.67, 62.29)	73.46
	50	HZ_P	0.00 (59.83, 60.87)	100.00	0.00 (59.86, 60.78)	100.00	0.00 (59.96, 60.71)	100.00
		HZ_O	0.60 (60.33, 61.51)	100.00	1.39 (61.09, 62.33)	100.00	2.25 (61.98, 63.27)	100.00
		Prop	-0.17 (59.52, 60.92)	73.02	-0.44 (58.91, 60.95)	77.00	-0.76 (58.47, 61.21)	78.85

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)	CR	$p = 0.5$ Median (Q1, Q3)	CR	$p = 0.3$ Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (85.66, 88.64)	100.00	0.00 (85.93, 88.26)	100.00	0.00 (86.04, 88.20)	100.00
		HZ_O	0.51 (86.29, 88.99)	99.68	1.18 (86.98, 89.60)	99.77	1.73 (87.71, 90.16)	99.87
		Prop	0.88 (85.58, 89.61)	54.84	0.85 (85.59, 89.55)	54.37	0.78 (86.36, 89.63)	46.54
	30	HZ_P	0.00 (85.93, 88.28)	100.00	0.00 (86.05, 88.13)	100.00	0.00 (86.20, 87.91)	100.00
		HZ_O	0.29 (86.23, 88.75)	100.00	1.09 (87.04, 89.31)	99.68	1.72 (87.68, 89.86)	100.00
		Prop	1.36 (86.95, 89.82)	68.07	1.35 (87.18, 89.73)	62.50	1.45 (87.39, 89.59)	57.04
	50	HZ_P	0.00 (86.21, 87.98)	100.00	0.00 (86.21, 87.77)	100.00	0.00 (86.45, 87.79)	100.00
		HZ_O	0.38 (86.57, 88.39)	100.00	1.17 (87.11, 89.08)	100.00	1.69 (87.88, 89.58)	100.00
		Prop	1.48 (87.65, 89.61)	74.85	1.71 (87.58, 89.81)	73.80	1.58 (87.75, 89.55)	69.12
50-300	20	HZ_P	0.00 (88.36, 89.95)	100.00	0.00 (88.31, 89.87)	100.00	0.00 (88.26, 89.67)	100.00
		HZ_O	0.41 (88.74, 90.35)	100.00	0.87 (89.25, 90.64)	99.87	1.50 (89.86, 91.04)	100.00
		Prop	0.86 (88.85, 90.70)	34.30	0.73 (88.37, 90.77)	22.99	0.17 (81.22, 90.26)	13.12
	30	HZ_P	0.00 (88.17, 89.75)	100.00	0.00 (88.27, 89.67)	100.00	0.00 (88.39, 89.45)	100.00
		HZ_O	0.51 (88.67, 90.18)	100.00	0.93 (89.23, 90.55)	100.00	1.48 (89.82, 90.93)	100.00
		Prop	0.92 (89.20, 90.74)	42.68	1.14 (89.45, 90.76)	32.35	0.95 (88.81, 90.58)	17.66
	50	HZ_P	0.00 (88.39, 89.54)	100.00	0.00 (88.31, 89.47)	100.00	0.00 (88.40, 89.27)	100.00
		HZ_O	0.45 (88.80, 90.01)	100.00	1.00 (89.29, 90.41)	100.00	1.52 (89.87, 90.77)	100.00
		Prop	1.07 (89.43, 90.66)	55.37	1.29 (89.51, 90.71)	41.66	1.06 (89.34, 90.42)	20.57

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)	CR	$p = 0.5$ Median (Q1, Q3)	CR	$p = 0.3$ Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (73.61, 76.56)	100.00	0.00 (73.67, 76.34)	100.00	0.00 (73.86, 76.02)	100.00
		HZ_O	0.84 (74.29, 77.79)	100.00	1.58 (74.64, 78.27)	100.00	2.28 (75.25, 78.98)	99.90
		Prop	0.82 (73.56, 78.14)	38.60	0.30 (73.18, 77.90)	42.30	0.03 (71.93, 77.75)	36.14
	30	HZ_P	0.00 (73.84, 76.23)	100.00	0.00 (73.99, 76.00)	100.00	0.00 (73.98, 75.79)	100.00
		HZ_O	0.69 (74.43, 77.18)	100.00	1.42 (74.94, 77.89)	100.00	1.87 (75.31, 78.40)	100.00
		Prop	0.80 (74.22, 77.78)	50.25	0.64 (73.46, 78.12)	50.25	-0.29 (72.16, 76.84)	43.03
	50	HZ_P	0.00 (74.05, 75.81)	100.00	0.00 (74.05, 75.71)	100.00	0.00 (74.16, 75.55)	100.00
		HZ_O	0.84 (74.60, 76.84)	100.00	1.19 (75.00, 77.19)	100.00	1.96 (75.68, 77.98)	100.00
		Prop	0.80 (74.38, 77.23)	58.90	0.42 (73.84, 77.19)	56.16	-0.29 (72.97, 76.34)	49.70
50-300	20	HZ_P	0.00 (75.06, 77.41)	100.00	0.00 (75.13, 77.20)	100.00	0.00 (75.11, 76.95)	100.00
		HZ_O	0.72 (75.55, 78.31)	100.00	1.28 (75.94, 78.82)	99.90	1.94 (76.33, 79.39)	100.00
		Prop	0.04 (74.07, 78.16)	31.73	-0.30 (72.82, 77.77)	29.60	-0.97 (69.31, 77.99)	18.13
	30	HZ_P	0.00 (75.07, 77.11)	100.00	0.00 (75.17, 76.79)	100.00	0.00 (75.23, 76.61)	100.00
		HZ_O	0.61 (75.56, 77.87)	100.00	1.03 (75.81, 78.31)	100.00	1.76 (76.35, 78.99)	100.00
		Prop	0.09 (74.65, 77.39)	34.20	-0.01 (74.29, 77.71)	31.41	-0.86 (71.64, 76.64)	21.75
	50	HZ_P	0.00 (75.18, 76.70)	100.00	0.00 (75.27, 76.62)	100.00	0.00 (75.34, 76.40)	100.00
		HZ_O	0.56 (75.57, 77.42)	100.00	1.04 (75.92, 77.99)	100.00	1.52 (76.34, 78.43)	100.00
		Prop	0.27 (75.05, 77.47)	40.40	0.14 (74.92, 77.30)	41.06	-0.31 (74.20, 76.82)	25.89

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)	CR	$p = 0.5$ Median (Q1, Q3)	CR	$p = 0.3$ Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (59.11, 61.12)	100.00	0.00 (59.26, 61.07)	99.90	0.00 (59.47, 60.91)	100.00
		HZ_O	0.77 (59.87, 62.08)	99.80	1.99 (60.84, 63.54)	99.90	3.44 (62.11, 64.93)	99.70
		Prop	0.63 (59.18, 62.10)	42.93	0.57 (58.43, 62.59)	44.58	-0.08 (57.77, 63.70)	44.84
	30	HZ_P	0.00 (59.44, 61.09)	100.00	0.00 (59.45, 60.86)	99.90	0.00 (59.54, 60.75)	100.00
		HZ_O	0.81 (60.10, 62.12)	100.00	1.94 (61.08, 63.23)	100.00	3.25 (62.23, 64.46)	99.80
		Prop	0.26 (59.32, 61.78)	49.65	-0.49 (58.39, 61.39)	49.00	-1.04 (57.50, 61.17)	52.30
	50	HZ_P	0.00 (59.56, 60.86)	100.00	0.00 (59.59, 60.71)	100.00	0.00 (59.70, 60.62)	100.00
		HZ_O	0.79 (60.32, 61.77)	100.00	1.90 (61.27, 62.94)	100.00	3.20 (62.56, 64.30)	100.00
		Prop	0.05 (59.38, 61.07)	53.62	-0.80 (58.44, 60.44)	54.05	-1.68 (57.32, 59.79)	56.30
50-300	20	HZ_P	0.00 (59.56, 61.17)	100.00	0.00 (59.64, 61.10)	99.90	0.00 (59.82, 60.87)	100.00
		HZ_O	0.82 (60.29, 62.10)	99.90	1.75 (61.14, 63.04)	99.90	2.64 (62.05, 64.00)	99.80
		Prop	0.54 (59.60, 62.18)	34.21	0.28 (59.18, 62.13)	40.42	-0.37 (58.64, 61.74)	37.36
	30	HZ_P	0.00 (59.68, 61.00)	100.00	0.00 (59.81, 60.87)	100.00	0.00 (59.87, 60.77)	100.00
		HZ_O	0.76 (60.42, 61.81)	100.00	1.76 (61.33, 62.82)	100.00	2.70 (62.21, 63.86)	99.90
		Prop	0.03 (59.47, 61.38)	41.15	-0.24 (59.10, 61.39)	43.66	-0.33 (58.74, 61.27)	40.46
	50	HZ_P	0.00 (59.86, 60.85)	100.00	0.00 (59.95, 60.83)	100.00	0.00 (60.01, 60.69)	100.00
		HZ_O	0.79 (60.52, 61.71)	100.00	1.74 (61.50, 62.72)	100.00	2.69 (62.45, 63.65)	100.00
		Prop	0.00 (59.67, 61.10)	49.45	-0.42 (59.20, 60.74)	49.75	-0.67 (58.79, 60.46)	48.30

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)	CR	$p = 0.5$ Median (Q1, Q3)	CR	$p = 0.3$ Median (Q1, Q3)	CR
50-150	20	HZ$_P$	0.00 (86.28, 88.76)	99.90	0.00 (86.25, 88.59)	100.00	0.00 (86.62, 88.52)	100.00
		HZ$_O$	0.52 (86.77, 89.31)	99.79	1.00 (87.06, 89.73)	99.79	1.82 (88.22, 90.32)	100.00
		Prop	0.36 (85.66, 89.62)	39.94	0.58 (85.15, 89.62)	38.67	0.35 (85.05, 89.25)	25.51
	30	HZ$_P$	0.00 (86.36, 88.52)	100.00	0.00 (86.55, 88.36)	100.00	0.00 (86.66, 88.19)	100.00
		HZ$_O$	0.48 (86.79, 89.01)	100.00	1.03 (87.36, 89.49)	100.00	1.66 (88.09, 90.04)	100.00
		Prop	1.19 (87.36, 89.84)	49.59	0.90 (87.05, 89.67)	43.51	0.42 (86.69, 88.99)	32.26
	50	HZ$_P$	0.00 (86.60, 88.22)	100.00	0.00 (86.70, 88.07)	100.00	0.00 (86.83, 87.97)	100.00
		HZ$_O$	0.40 (87.04, 88.70)	100.00	0.96 (87.44, 89.18)	100.00	1.73 (88.21, 89.86)	100.00
		Prop	1.18 (87.54, 89.55)	57.77	1.04 (87.34, 89.39)	52.17	0.98 (87.50, 89.15)	39.86
50-300	20	HZ$_P$	0.00 (88.53, 90.07)	100.00	0.00 (88.68, 90.00)	100.00	0.00 (88.64, 89.80)	100.00
		HZ$_O$	0.41 (88.90, 90.48)	100.00	0.78 (89.56, 90.72)	100.00	1.25 (90.02, 91.05)	100.00
		Prop	-2.11 (78.15, 90.03)	19.04	-11.84 (72.34, 88.58)	21.96	-17.06 (65.91, 78.39)	17.31
	30	HZ$_P$	0.00 (88.67, 89.96)	100.00	0.00 (88.65, 89.83)	100.00	0.00 (88.64, 89.65)	100.00
		HZ$_O$	0.39 (89.09, 90.32)	100.00	0.87 (89.59, 90.64)	100.00	1.31 (90.02, 90.91)	100.00
		Prop	0.31 (85.89, 90.43)	19.33	-7.50 (73.20, 89.58)	17.63	-17.57 (63.67, 78.55)	13.85
	50	HZ$_P$	0.00 (88.70, 89.79)	100.00	0.00 (88.69, 89.71)	100.00	0.00 (88.68, 89.57)	100.00
		HZ$_O$	0.46 (89.15, 90.24)	100.00	0.84 (89.56, 90.50)	100.00	1.34 (90.06, 90.79)	100.00
		Prop	0.44 (88.70, 90.39)	23.17	-0.11 (80.83, 90.32)	14.69	-15.59 (61.97, 84.15)	9.32

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.