

Supplementary material 5. Sensitivity, specificity, +LR, –LR, PPV, NPV, and Youden’s index for different PHQ cut-off points compared to the gold standard.

Method	Cut-off Points	n (%)	Sensitivity (95%CI)	Specificity (95%CI)	+LR (95%CI)	-LR (95%CI)	PPV (95%CI)	NPV (95%CI)	Youden Index
PHQ-9	≥1	1246 (92.5)	99.7 (98.3 - 100.0)	9.9 (8.1 - 11.9)	1.11 (1.08 - 1.13)	0.03 (0.00 - 0.22)	26.7 (24.3 - 29.3)	99.0 (94.6 - 100.0)	9.6
	≥2	1145 (85.0)	98.2 (96.1 - 99.3)	19.3 (17.0 - 21.9)	1.22 (1.18 - 1.26)	0.93 (0.04 - 0.21)	28.6 (26.0 - 31.4)	97.0 (93.6 - 98.9)	17.5
	≥3	1004 (74.5)	95.5 (92.7 - 97.5)	32.4 (29.5 - 35.4)	1.41 (1.35 - 1.48)	0.14 (0.84 - 0.23)	31.8 (28.9 - 34.8)	95.6 (92.9 - 97.5)	27.9
	≥4	850 (63.1)	91.3 (87.8 - 94.1)	46.2 (43.1 - 49.3)	1.70 (1.59 - 1.81)	0.19 (0.13 - 0.27)	35.9 (32.7 - 39.2)	94.2 (91.7 - 96.1)	37.5
	≥5	720 (53.5)	87.4 (83.4 - 90.8)	57.7 (54.6 - 60.8)	2.07 (1.90 - 2.25)	0.22 (0.16 - 0.29)	40.6 (36.9 - 44.2)	93.3 (91.1 - 95.1)	45.1
	≥6	627 (46.6)	80.5 (75.9 - 84.6)	64.7 (61.6 - 67.6)	2.28 (2.07 - 2.52)	0.30 (0.24 - 0.38)	42.9 (39.0 - 46.9)	91.0 (88.6 - 93.0)	45.2
	≥7	537 (39.9)	76.0 (71.1 - 80.5)	72.1 (69.2 - 74.8)	2.72 (2.42 - 3.06)	0.33 (0.27 - 0.40)	47.3 (43.0 - 51.6)	90.1 (87.9 - 92.1)	48.1
	≥8	454 (33.7)	68.9 (63.6 - 73.8)	77.9 (75.2 - 80.4)	3.11 (2.72 - 3.57)	0.40 (0.34 - 0.47)	50.7 (46.0 - 55.4)	88.4 (86.1 - 90.4)	46.8
	≥9	371 (27.5)	60.2 (54.7 - 65.5)	83.2 (80.8 - 85.5)	3.59 (3.05 - 4.22)	0.48 (0.42 - 0.55)	54.2 (49.0 - 59.3)	86.4 (84.1 - 88.5)	43.4
	≥10	309 (22.9)	54.2 (48.7 - 59.6)	87.4 (85.2 - 89.3)	4.29 (3.55 - 5.18)	0.52 (0.47 - 0.59)	58.6 (53.9 - 63.1)	85.3 (83.7 - 86.7)	41.6
	≥11	252 (18.7)	44.9 (39.5 - 50.4)	89.9 (87.9 - 91.7)	4.46 (3.58 - 5.55)	0.61 (0.56 - 0.68)	59.5 (53.2 - 65.6)	83.2 (80.8 - 85.4)	34.8
	≥12	212 (15.7)	38.9 (33.7 - 44.4)	91.9 (90.1 - 93.5)	4.81 (3.76 - 6.16)	0.67 (0.61 - 0.73)	61.3 (54.4 - 67.9)	82.0 (79.7 - 84.2)	30.8
	≥13	161 (12.0)	31.4 (26.5 - 36.7)	94.5 (92.9 - 95.8)	5.69 (4.21 - 7.67)	0.73 (0.67 - 0.78)	65.2 (57.3 - 72.5)	80.7 (78.3 - 82.9)	25.9
	≥14	138 (10.2)	26.3 (21.7 - 31.4)	95.1 (93.5 - 96.3)	5.34 (3.86 - 7.38)	0.78 (0.73 - 0.83)	63.8 (55.2 - 71.8)	79.7 (77.3 - 81.9)	21.4
	≥15	102 (7.6)	19.8 (15.6 - 24.4)	96.4 (95.1 - 97.5)	5.56 (3.78 - 8.19)	0.83 (0.79 - 0.88)	64.7 (54.6 - 73.9)	78.5 (76.1 - 80.7)	16.2
	≥16	79 (5.9)	15.3 (11.6 - 19.6)	97.2 (96.0 - 98.2)	5.52 (3.54 - 8.61)	0.87 (0.83 - 0.91)	64.6 (53.0 - 75.0)	77.7 (75.3 - 79.9)	12.5
	≥17	57 (4.2)	10.5 (7.4 - 14.3)	97.8 (96.7 - 98.6)	4.83 (2.87 - 8.11)	0.92 (0.88 - 0.95)	61.4 (47.6 - 74.0)	76.8 (74.4 - 79.1)	8.3
	≥18	48 (3.6)	8.4 (5.6 - 11.9)	98.0 (97.0 - 98.8)	4.25 (2.42 - 7.44)	0.94 (0.90 - 0.97)	58.3 (43.2 - 72.4)	76.4 (74.0 - 78.7)	6.4
	≥19	40 (3.0)	6.9 (4.4 - 10.2)	98.3 (97.3 - 99.0)	4.10 (2.22 - 7.59)	0.95 (0.92 - 0.98)	57.5 (40.9 - 73.0)	76.2 (73.8 - 78.5)	5.2
	≥20	35 (2.4)	4.5 (2.5 - 7.3)	98.3 (97.3 - 99.0)	2.68 (1.35 - 5.30)	0.97 (0.95 - 1.00)	46.9 (29.1 - 65.3)	75.7 (73.3 - 78.0)	2.8
≥21	26 (1.9)	3.9 (2.1 - 6.6)	98.7 (97.8 - 99.3)	3.03 (1.42 - 6.48)	0.97 (0.95 - 1.00)	50.0 (29.9 - 70.1)	75.7 (73.3 - 78.0)	2.6	
≥22	20 (1.5)	2.7 (1.2 - 5.1)	98.9 (98.1 - 99.5)	2.48 (1.04 - 5.94)	0.98 (0.97 - 1.00)	45.0 (23.1 - 68.5)	75.5 (73.1 - 77.8)	1.6	
≥23	16 (1.2)	1.5 (0.5 - 3.5)	98.9 (98.1 - 99.5)	1.38 (0.48 - 3.94)	1.00 (0.98 - 1.01)	31.3 (11.0 - 58.7)	75.3 (72.9 - 77.6)	0.4	
≥24	10 (0.7)	0.9 (0.2 - 2.6)	99.3 (98.6 - 99.7)	1.30 (0.34 - 5.00)	1.00 (0.99 - 1.01)	30.0 (6.7 - 65.2)	75.2 (72.8 - 77.5)	0.2	
≥25	4 (0.3)	0.3 (0.0 - 1.7)	99.7 (99.1 - 99.9)	1.01 (0.11 - 9.69)	1.00 (0.99 - 1.01)	25.0 (0.6 - 80.6)	75.2 (72.8 - 77.5)	0.0	
≥26	2 (0.2)	0.0 (0.0 - 1.1)	99.8 (99.3 - 100.0)	0.00 (0.00 - 0.00)	1.00 (1.00 - 1.00)	0.0 (0.0 - 84.2)	75.2 (72.8 - 77.5)	-0.2	
≥27	2 (0.2)	0.0 (0.0 - 1.1)	99.8 (99.3 - 100.0)	0.00 (0.00 - 0.00)	1.00 (1.00 - 1.00)	0.0 (0.0 - 84.2)	75.2 (72.8 - 77.5)	-0.2	
PHQ-8	≥1	1244 (92.4)	99.4 (97.9 - 99.9)	10.0 (8.2 - 12.0)	1.10 (1.08 - 1.13)	0.06 (0.01 - 0.24)	26.7 (24.2 - 29.2)	98.1 (93.2 - 99.8)	9.4
	≥2	1141 (84.7)	98.2 (96.1 - 99.3)	19.7 (17.3 - 22.3)	1.22 (1.18 - 1.27)	0.09 (0.04 - 0.20)	28.7 (26.1 - 31.5)	97.1 (93.8 - 98.9)	17.9
	≥3	998 (74.1)	95.5 (92.7 - 97.5)	33.0 (30.1 - 36.0)	1.42 (1.36 - 1.50)	0.14 (0.08 - 0.23)	32.0 (29.1 - 35.0)	95.7 (93.0 - 97.6)	28.5
	≥4	846 (62.8)	91.3 (87.8 - 94.1)	46.6 (43.5 - 49.7)	1.71 (1.60 - 1.83)	0.19 (0.13 - 0.27)	36.1 (32.8 - 39.4)	94.2 (91.8 - 96.1)	37.9
	≥5	701 (52.0)	85.6 (81.4 - 89.2)	59.0 (55.9 - 62.1)	2.09 (1.92 - 2.28)	0.24 (0.19 - 0.32)	40.8 (37.1 - 44.5)	92.6 (90.3 - 94.5)	44.7
	≥6	611 (45.4)	79.9 (75.2 - 84.1)	66.0 (63.0 - 69.0)	2.35 (2.13 - 2.61)	0.30 (0.24 - 0.38)	43.7 (39.7 - 47.7)	90.9 (88.6 - 92.9)	46.0
	≥7	521 (38.7)	74.3 (69.2 - 78.9)	73.1 (70.2 - 75.8)	2.76 (2.44 - 3.10)	0.35 (0.29 - 0.42)	47.6 (43.2 - 52.0)	89.6 (87.3 - 91.6)	47.4

≥8	428 (31.8)	65.6 (60.2 - 70.7)	79.4 (76.7 - 81.8)	3.18 (2.75 - 3.67)	0.43 (0.37 - 0.50)	51.2 (46.3 - 56.0)	87.5 (85.2 - 89.6)	44.9	
≥9	357 (26.5)	58.4 (52.9 - 63.7)	84.0 (81.6 - 86.2)	3.65 (3.09 - 4.32)	0.50 (0.44 - 0.56)	54.6 (49.3 - 59.9)	86.0 (83.6 - 88.1)	42.4	
≥10	286 (21.2)	50.0 (44.5 - 55.5)	88.3 (86.1 - 90.2)	4.26 (3.48 - 5.20)	0.57 (0.51 - 0.63)	58.4 (52.4 - 64.2)	84.3 (81.9 - 86.4)	38.3	
≥11	233 (17.3)	42.2 (36.9 - 47.7)	90.9 (89.0 - 92.6)	4.65 (3.69 - 5.86)	0.64 (0.58 - 0.70)	60.5 (53.9 - 66.8)	82.7 (80.3 - 84.9)	33.1	
≥12	189 (14.0)	34.7 (29.6 - 40.1)	92.8 (91.0 - 94.3)	4.82 (3.70 - 6.28)	0.70 (0.65 - 0.76)	61.4 (54.0 - 68.4)	81.2 (78.8 - 83.4)	27.5	
≥13	138 (10.2)	27.2 (22.5 - 32.4)	95.4 (93.9 - 96.6)	5.87 (4.22 - 8.17)	0.76 (0.71 - 0.82)	65.9 (57.4 - 73.8)	79.9 (77.5 - 82.1)	22.6	
≥14	103 (8.1)	21.9 (17.5 - 26.7)	96.4 (95.1 - 97.5)	6.15 (4.21 - 8.99)	0.81 (0.76 - 0.86)	67.0 (57.3 - 75.7)	78.9 (76.5 - 81.2)	18.3	
≥15	80 (5.9)	15.6 (11.9 - 19.9)	97.2 (96.0 - 98.2)	5.63 (3.62 - 8.77)	0.87 (0.83 - 0.91)	65.0 (53.5 - 75.3)	77.7 (75.3 - 80.0)	12.8	
≥16	58 (4.3)	10.5 (7.4 - 14.3)	97.7 (96.6 - 98.6)	4.62 (2.77 - 7.70)	0.92 (0.88 - 0.95)	60.3 (46.6 - 73.0)	76.8 (74.4 - 79.1)	8.2	
≥17	46 (3.4)	7.2 (4.7 - 10.5)	97.8 (96.7 - 98.6)	3.31 (1.88 - 5.82)	0.95 (0.92 - 0.98)	52.2 (36.9 - 67.1)	76.2 (73.8 - 78.5)	5.0	
≥18	36 (2.7)	5.7 (3.5 - 8.7)	98.3 (97.3 - 99.0)	3.39 (1.78 - 6.44)	0.96 (0.93 - 0.99)	52.8 (35.5 - 69.6)	76.0 (73.6 - 78.3)	4.0	
≥19	30 (2.2)	4.8 (2.8 - 7.7)	98.6 (97.7 - 99.2)	3.47 (1.71 - 7.03)	0.97 (0.94 - 0.99)	53.3 (34.3 - 71.7)	75.9 (73.4 - 78.1)	3.4	
≥20	24 (1.8)	3.0 (1.4 - 5.4)	98.6 (97.7 - 99.2)	2.17 (0.97 - 4.83)	0.98 (0.96 - 1.00)	41.7 (22.1 - 63.4)	75.5 (73.1 - 77.8)	1.6	
≥21	15 (1.1)	1.5 (0.5 - 3.5)	99.0 (98.2 - 99.5)	1.52 (0.52 - 4.41)	0.99 (0.98 - 1.01)	33.3 (11.8 - 61.6)	75.3 (72.9 - 77.6)	0.5	
≥22	7 (0.5)	0.6 (0.1 - 2.1)	99.5 (98.9 - 99.8)	1.21 (0.24 - 6.22)	1.00 (0.99 - 1.01)	28.6 (3.7 - 71.0)	75.2 (72.8 - 77.5)	0.1	
≥23	4 (0.3)	0.3 (0.0 - 1.7)	99.7 (99.1 - 99.9)	1.01 (0.11 - 9.69)	1.00 (0.99 - 1.01)	25.0 (0.6 - 80.6)	75.2 (72.8 - 77.5)	0.0	
≥24	2 (0.2)	0.0 (0.0 - 1.1)	99.8 (99.3 - 100.0)	0.00 (0.00 - 0.00)	1.00 (1.00 - 1.00)	0.0 (0.0 - 84.2)	75.2 (72.8 - 77.5)	-0.2	
PHQ-9 algorithm	183 (13.6)	34.7 (29.6 - 40.1)	93.4 (91.7 - 94.8)	5.25 (3.99 - 6.91)	0.70 (0.65 - 0.76)	63.4 (56.0 - 70.4)	81.3 (78.9 - 83.5)	28.1	
PHQ-9 adjusted algorithm	601 (44.6)	78.1 (73.3 - 82.5)	66.4 (63.4 - 69.3)	2.33 (2.10 - 2.58)	0.33 (0.27 - 0.41)	43.4 (39.4 - 47.5)	90.2 (87.9 - 92.3)	44.5	
PHQ-2	≥1	1052 (78.1)	95.2 (92.3 - 97.2)	27.5 (24.8 - 30.4)	1.31 (1.26 - 1.37)	0.17 (0.11 - 0.28)	30.2 (27.5 - 33.1)	94.6 (91.3 - 96.9)	22.7
	≥2	730 (54.2)	84.7 (80.4 - 88.4)	55.9 (52.8 - 59.0)	1.92 (1.77 - 2.09)	0.27 (0.21 - 0.35)	38.8 (35.2 - 42.4)	91.7 (89.3 - 93.8)	40.6
	≥3	358 (26.6)	55.4 (49.9 - 60.8)	82.9 (80.5 - 85.2)	3.24 (2.75 - 3.83)	0.54 (0.48 - 0.61)	51.7 (46.4 - 57.0)	84.9 (82.6 - 87.1)	38.3
	≥4	225 (16.7)	39.5 (34.2 - 45.0)	90.8 (88.9 - 92.5)	4.30 (3.40 - 5.44)	0.67 (0.61 - 0.73)	58.7 (51.9 - 65.2)	82.0 (79.6 - 84.2)	30.3
	≥5	99 (7.4)	19.2 (15.1 - 23.8)	96.5 (95.2 - 97.6)	5.55 (3.74 - 8.22)	0.84 (0.79 - 0.88)	64.6 (54.4 - 74.0)	78.4 (76.0 - 80.6)	15.7
	≥6	63 (4.7)	12.0 (8.7 - 15.9)	97.7 (96.6 - 98.6)	5.27 (3.21 - 8.68)	0.90 (0.87 - 0.94)	63.5 (50.4 - 75.3)	77.1 (74.7 - 79.4)	9.7

Note: +LR = Positive likelihood ratio. -LR = Negative likelihood ratio. PPV= positive predictive value. NPV= negative predictive value. Youden's Index = Sensitivity+Specificity-1. 95%CI = 95% confidence interval. PHQ = Patient Health Questionnaire. Bold values represent the cohort point with the highest Youden Index.