

Cost-effectiveness Analysis of Stroke Rehabilitation in Sub-acute Rehabilitation Care Units

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Abstract

The objective of this study was to assess the evidence on the cost-effectiveness of three rehabilitation services after stroke: sub-acute rehabilitation care units, general units, medical care units. We collected data on 128 patients with stroke. We examined utility of health status measured by Health Utilities Index, hospital charge, and cost-effectiveness ratio. Mean gained utility were 0.21 in sub-acute rehabilitation care units, 0.29 in general units and 0.22 in care units. We found no significant difference between groups in gained utility. Mean hospital charge were \$12,245 for sub-acute rehabilitation care units, \$20,209 for general units, \$19,127 for medical care units. The cost-effectiveness ratio per 0.1 health utilities score gained in sub-acute rehabilitation care units was \$20 750, there is that rehabilitation programs in sub-acute rehabilitation care units is the most cost-effective of the three strategies (and a 37.5% and a 33.2% probability that the general units and medical care units, respectively).

[key words] stroke, rehabilitation, sub-acute rehabilitation care unit, health-related quality of life, health utility, Health Utilities Index, cost-effectiveness analysis

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添 付 資 料

1 1. 【添付資料】

市町村別健康寿命の試算結果

平均寿命を固定して試算した評価対象別の健康寿命。追跡年度が短いのでこの結果は、前述したとおり介護保険制度の普及率が高くなりかつ要介護認定者が増加するほど健康寿命が年々短くなる結果になる。介護保険の年齢階級別要介護認定者数からの試算（市町村比較が可能）は各都道府県で分析評価に使用する傾向がある。

各地域で行われた健康寿命と他の要因との関連分析の状況

地域・政策	他の要因との関連分析結果
島根県・ 健康長寿しまね	H12の市町村別平均自立期間と保健・福祉・医療・産業・経済指標との相関分析。 男性は、農業従事者割合、保健師事業と相関、がんや心疾患とマイナス相関。 女性は、飲食料品小売業数、老人クラブ数、保健師訪問数、デイサービスと相関、人口密度やBMI 25以上、心疾患とマイナス相関。
山梨県	健康寿命日本一といわれる要因を分析。 解析は、症例対照研究、コホート研究、生態学的研究を総合的に評価 H15年4月の介護保険データで全国都道府県の健康寿命と統計データの関連を分析。
	正相関要因は以下のとおり ①社会的ネットワーク（ボランティア活動、無尽） ②食生活（規則正しい食事、スローフード＝ほうとう） ③生きがい（趣味） ④健康な生活習慣（喫煙、運動習慣） ⑤心の健康と体の健康の関連（体力が衰え外出が減って閉じこもり、うつになる） ⑥その他（脳卒中との関連・保健医療システムとの関連は見出せず、経済的余裕との関連あり）
福井県	福井の健康長寿の要因（北陸の平均寿命は全国レベルで低位であるにもかかわらず福井県のみ男女とも全国2位の長寿県である）を解くために、分析を行い、次の5点

	に集約している。
	<p>正相関要因は以下のとおり</p> <p>①福井の食生活（バランスのよい食事と脂肪摂取、カリウム量、塩分控えめ）</p> <p>②働き者でボランティア活動が盛ん（女性の労働時間、5歳以上有職者、ボランティア年間行動者率）</p> <p>③家族と地域で育む穏やかな長寿の気風（祖先や家族を大切に、寺院・神社数、「お講」の数、諸会費・祭祀費・交際費が多い、3世代世帯、離婚が少ない、広い持ち家、）</p> <p>④保健と医療と福祉が支える（環境・健康ボランティア、医療・福祉施設整備）</p> <p>⑤心の健康を支える経済的ゆとり（貯蓄、生命保険金、老後の収入など経済ストレスが少ない、水田整備率、農家収入）</p>

群馬県下各市町村の健康寿命、65歳健康余命、障害期間の年次推移
（群馬県庁提供参考資料）

表1に4の方法による健康寿命の平成13-16年の年次推移を示す。倉渕村は平成13年からほぼ男性が6-8位であるのに対し、女性が52-53位と低い結果になる。

表2は4の方法による65歳時健康余命の年次推移である。倉渕村は男性は年次改善傾向を示し、平成16年における男性健康余命は16.65年、女性はほぼ横ばいで平成16年度には19.47年である。

表3は障害期間の年次推移をあらわす。どの地区とも女性のほうが男性の3倍弱障害期間は長い傾向を示すが、地域差は大きくはない。男女とも倉渕村は順位で見ると中央に属している。以下グラフは健康寿命、65歳健康余命、障害期間を男女別に地区ごとに示したものである。倉渕村を太線で明示した。

《市町村別健康寿命の試算》（群馬県庁提供）

平成16年に群馬県下市町村別の健康寿命の試算が行われた。健康寿命の定義に従い、地域在住者の自立して生活できる期間を、介護保険の要介護状態（要介護2～5）になっていない期間として、県内各市町村別に、平成13～16年まで試算されている。これは基礎データが客観的で正確である反面、地区ごとに介護保険制度の導入に時間差があることと、要介護度認定にも時間差があることによって普及すればするほど、認定されればされるほど年々健康寿命が短くなるという統計上のジレンマを抱えている。（障害調整ができない場合、単純

寿命が健康寿命の最大値となってしまうためである。)

(1)健康寿命計算ワークシート

(<http://home.att.ne.jp/star/publichealth/kenkou.htm>) を利用。

基本データをワークシートに入力すると、結果が計算される。

(2)基本データ (市町村別・男女別・年齢5歳階級別の次のデータ)

人口：国勢調査 (平成12年) による人口

死亡数：人口動態統計 (平成11～15年) による死亡数

要介護者数：平成13～16年10月の要介護2～5の認定者数 (国保連データ)

(3)算出項目

平均余命 = H12 国勢調査人口と死亡数 (H11～15) で計算 (各年度を通じて同一数値)

65歳健康余命 = 65歳の自立平均余命 = 65歳以上の自立者数 /

65歳人口

障害期間 = 65歳平均余命 - 65歳健康余命

健康寿命 = 0歳の平均余命 - 65歳障害期間

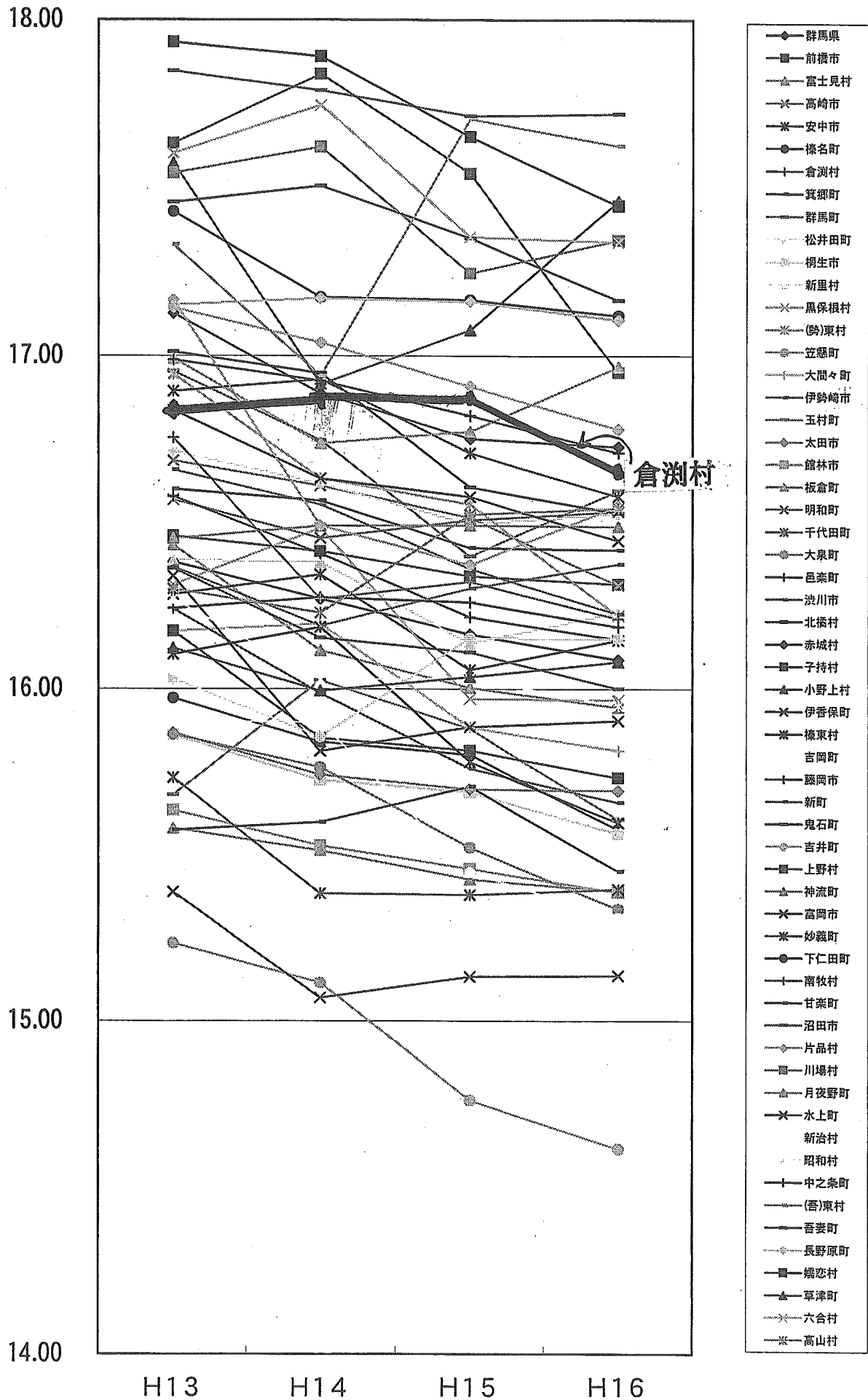
表1 健康寿命の年次推移 (平成13年～平成16年)

		男 性								女 性								
		H13	順位	H14	順位	H15	順位	H16	順位	H13	順位	H14	順位	H15	順位	H16	順位	
	群馬県	76.74		76.63		76.53		76.45		82.06		81.78		81.50		81.32		
前橋圏域	前橋市	77.17	17	77.13	13	77.05	13	77.03	13	82.23	26	81.96	29	81.72	27	81.67	21	
	富士見村	76.80	24	76.48	32	76.37	32	76.31	31	82.14	32	81.76	34	81.45	35	81.14	34	
高崎圏域	高崎市	77.13	18	77.05	17	76.96	17	76.76	23	82.03	35	81.78	32	81.56	30	81.28	32	
	安中市	76.32	40	76.38	35	76.10	42	76.19	36	81.35	48	81.17	44	80.68	49	80.56	48	
	榛名町	76.20	43	76.07	45	76.03	43	75.80	45	82.32	24	82.04	24	81.96	20	81.42	27	
	倉沢村	77.94	8	77.97	6	77.97	6	77.74	6	81.01	53	80.66	53	80.70	47	80.31	52	
			77.07	20	77.03	18	76.89	21	76.89	17	82.50	20	82.33	20	81.77	26	81.63	22
			77.95	7	77.74	8	77.39	9	77.59	8	83.22	12	82.75	15	82.54	11	82.60	10
桐生圏域	群馬町	77.02	22	76.92	22	76.80	23	76.83	19	81.60	42	81.29	42	80.80	45	80.72	45	
	桐生市	75.65	52	75.52	51	75.48	49	75.36	50	81.43	45	81.05	49	80.86	44	80.63	46	
	新里村	76.23	42	76.23	39	75.98	44	76.08	40	82.31	25	82.04	23	81.95	21	81.59	25	
	黒保根村	75.54	53	75.71	47	75.20	54	75.20	52	82.22	27	81.98	26	81.84	25	81.43	26	
	(勢)東村	75.78	48	75.47	52	75.39	50	75.06	54	81.02	52	81.20	43	80.64	50	80.37	51	
	笠懸町	75.73	51	75.61	49	75.26	52	75.11	53	82.35	23	81.98	27	81.46	34	81.09	35	
大間々町	76.12	46	76.14	42	75.83	46	75.76	46	81.57	44	81.58	37	81.48	32	81.21	33		
伊勢崎圏域	伊勢崎市	76.68	29	76.43	33	76.20	37	76.10	39	81.93	38	81.57	38	81.26	39	81.07	36	
	玉村町	76.38	37	76.72	25	76.58	28	76.31	33	82.00	37	81.45	41	81.29	38	80.98	39	
太田館林圏域	太田市	76.41	36	76.28	37	76.24	34	76.23	34	81.43	46	81.11	46	80.89	43	80.75	44	
	館林市	75.74	50	75.63	48	75.56	47	75.49	47	81.28	49	81.05	50	80.69	48	80.44	49	
	板倉町	74.36	56	74.29	56	74.20	56	74.17	56	81.27	50	81.01	51	81.07	41	80.95	40	
	明和町	76.50	35	76.39	34	76.44	30	76.47	28	82.79	16	81.97	28	81.86	24	81.34	29	
	千代田町	74.21	57	73.86	57	73.86	57	73.88	57	82.77	17	82.25	22	81.94	22	81.60	24	
	大泉町	76.84	23	76.74	24	76.50	29	76.31	32	81.42	47	81.11	45	80.61	51	80.42	50	
邑楽町	76.16	44	76.20	40	76.18	39	76.11	38	82.03	36	81.67	36	81.31	37	80.93	41		
渋川圏域	渋川市	77.20	14	77.09	15	76.90	19	76.77	22	82.10	34	82.00	25	81.53	31	81.29	31	
	北橋村	77.03	21	76.96	19	76.62	26	76.54	26	82.13	33	81.72	35	81.71	28	81.62	23	
	赤城村	78.92	3	78.68	3	78.55	3	78.52	4	82.48	21	82.49	19	82.03	19	81.32	30	
	子持村	76.59	32	76.27	38	76.23	35	76.15	37	81.60	43	81.05	48	80.80	46	80.81	43	
	小野上村	78.62	5	77.96	7	78.12	5	78.51	5	80.90	54	80.53	54	80.09	54	79.46	55	
	伊香保町	76.34	39	75.81	46	75.88	45	75.90	44	79.99	56	80.23	55	79.82	55	79.41	56	
	榛東村	76.53	34	76.62	26	76.21	36	76.03	41	82.16	31	81.77	33	80.55	52	80.22	53	
	吉岡町	76.60	30	76.60	28	76.15	40	76.01	43	83.14	13	83.05	10	82.47	13	82.57	11	
藤岡圏域	藤岡市	76.74	26	76.57	29	76.38	31	76.31	30	82.18	30	81.84	31	81.47	33	81.04	38	
	新町	76.73	27	76.55	30	76.66	25	76.74	24	81.68	41	81.57	39	80.93	42	80.57	47	
	鬼石町	76.77	25	76.82	23	76.67	24	76.48	27	83.30	9	83.52	6	82.81	9	82.70	8	
	吉井町	77.25	12	77.15	12	77.02	14	76.89	16	82.72	18	82.85	13	82.35	14	82.43	14	
	上野村	80.17	1	80.38	1	80.09	1	79.49	1	86.05	1	86.39	1	85.56	1	84.99	1	
	神流町	76.16	45	76.19	41	76.20	38	76.19	35	84.41	3	84.12	3	84.11	3	84.09	3	
富岡圏域	富岡市	77.28	11	77.07	16	77.02	15	76.89	18	82.48	22	82.32	21	82.04	18	81.71	20	
	妙義町	77.08	19	77.12	14	76.90	20	76.77	21	83.23	11	82.82	14	82.19	17	81.88	18	
	下仁田町	77.20	13	76.95	20	76.94	18	76.90	15	81.20	51	80.76	52	80.53	53	80.81	42	
	南牧村	74.83	55	74.35	55	74.40	55	74.29	55	80.03	55	79.66	56	79.73	56	79.64	54	
	甘楽町	77.19	16	77.21	11	77.32	11	77.06	12	83.01	15	82.86	12	82.52	12	82.49	13	
沼田圏域	沼田市	75.78	49	75.57	50	75.52	48	75.41	49	81.86	39	81.56	40	81.40	36	81.35	28	
	片品村	76.08	47	75.40	53	75.29	51	75.46	48	82.22	28	82.53	18	81.88	23	82.02	16	
	川場村	77.64	10	77.72	9	77.34	10	77.44	9	85.28	2	85.08	2	85.03	2	84.97	2	
	月夜野町	77.20	15	76.94	21	76.98	16	77.17	11	83.27	10	82.91	11	82.27	16	81.94	17	
	水上町	73.47	58	73.15	58	73.22	58	73.22	58	79.59	57	79.47	57	79.41	57	78.94	57	
	新治村	76.34	38	76.10	43	76.11	41	76.02	42	82.71	19	82.72	16	82.31	15	82.03	15	
	昭和村	76.25	41	76.07	44	76.37	33	76.37	29	83.10	14	82.72	17	82.72	10	82.65	9	
吾妻圏域	中之条町	77.68	9	77.62	10	77.51	8	77.40	10	83.40	8	83.13	9	82.90	8	82.78	7	
	(香)東村	76.70	28	76.31	36	77.07	12	76.99	14	83.68	4	83.75	4	83.20	4	83.39	4	
	吾妻町	78.67	4	78.61	4	78.54	4	78.55	3	83.67	6	83.37	8	82.90	7	82.93	6	
	長野原町	76.59	31	76.61	27	76.60	27	76.55	25	83.48	7	83.39	7	83.12	5	83.08	5	
	嬭恋村	78.08	6	78.04	5	77.80	7	77.60	7	83.67	5	83.69	5	83.11	6	82.57	12	
	草津町	75.33	54	75.20	54	75.25	53	75.29	51	82.20	29	81.88	30	81.58	29	81.84	19	
	六合村	79.14	2	79.29	2	78.90	2	78.88	2	77.02	58	76.87	58	76.80	58	76.75	58	
高山村	76.58	33	76.51	31	76.80	22	76.82	20	81.85	40	81.11	47	81.14	40	81.07	37		

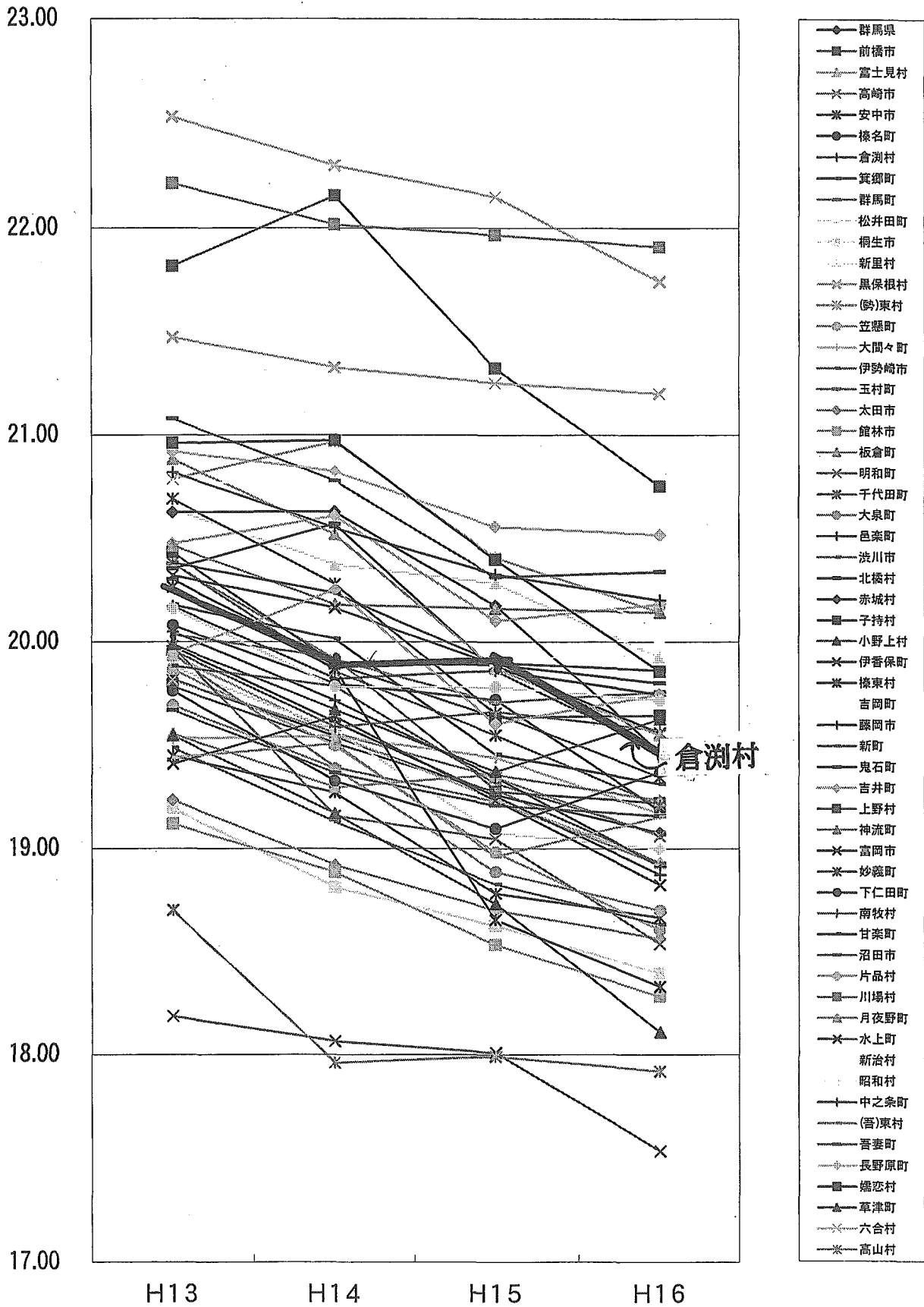
表3 障害期間の年次推移（平成13年～平成16年）

	男 性								女 性								
	H13	順位	H14	順位	H15	順位	H16	順位	H13	順位	H14	順位	H15	順位	H16	順位	
群馬県	1.27		1.38		1.49		1.57		2.62		2.90		3.18		3.36		
前橋圏域	前橋市	1.41	48	1.45	38	1.53	36	1.55	32	2.90	51	3.18	50	3.41	46	3.46	39
	富士見村	1.35	44	1.67	52	1.78	53	1.84	52	2.72	42	3.10	46	3.42	47	3.72	49
高崎圏域	高崎市	1.17	26	1.24	19	1.34	20	1.54	29	2.56	33	2.82	32	3.03	30	3.32	32
	安中市	1.46	51	1.40	33	1.69	50	1.60	39	2.92	52	3.10	45	3.59	54	3.70	47
	榛名町	1.16	25	1.29	24	1.33	19	1.55	33	2.23	17	2.52	23	2.60	13	3.13	24
	倉沢村	1.35	41	1.31	27	1.32	17	1.54	30	2.69	40	3.04	43	3.01	29	3.40	35
	箕郷町	0.94	9	0.98	8	1.12	9	1.12	8	1.99	12	2.16	9	2.72	15	2.86	14
	群馬町	1.53	53	1.74	53	2.09	58	1.89	54	2.68	39	3.14	47	3.35	43	3.30	31
	松井田町	1.44	49	1.54	43	1.66	48	1.63	42	2.63	37	2.94	40	3.44	50	3.52	41
桐生圏域	桐生市	1.40	47	1.54	44	1.57	44	1.70	47	2.78	47	3.16	49	3.35	42	3.58	46
	新里村	1.30	33	1.30	25	1.55	40	1.45	21	2.28	20	2.54	25	2.64	14	2.99	20
	黒保根村	1.06	13	0.89	7	1.41	26	1.41	19	1.96	10	2.19	11	2.34	7	2.75	12
	(勢)東村	0.44	1	0.76	4	0.83	3	1.17	11	2.37	23	2.19	12	2.75	16	3.02	22
	笠懸町	1.22	29	1.34	30	1.69	51	1.84	51	1.97	11	2.34	18	2.86	22	3.24	27
大間々町	1.18	27	1.16	18	1.47	29	1.53	27	2.33	21	2.32	17	2.43	10	2.70	9	
伊勢崎圏	伊勢崎市	1.30	34	1.55	46	1.78	52	1.88	53	2.86	50	3.22	52	3.52	53	3.72	48
	玉村町	1.46	52	1.12	14	1.27	15	1.54	28	2.75	44	3.30	54	3.47	51	3.77	50
太田館林圏域	太田市	1.39	46	1.51	40	1.55	41	1.56	34	2.84	48	3.16	48	3.38	44	3.52	42
	館林市	1.35	42	1.45	37	1.52	35	1.59	37	2.72	43	2.96	41	3.31	39	3.56	45
	板倉町	1.02	11	1.09	13	1.18	10	1.21	13	2.04	14	2.30	16	2.24	4	2.36	6
	明和町	1.20	28	1.31	26	1.26	13	1.23	14	2.39	24	3.21	51	3.32	40	3.83	52
	千代田町	0.91	8	1.26	22	1.26	14	1.24	15	1.75	6	2.27	15	2.58	12	2.92	17
	大泉町	1.22	30	1.32	28	1.56	42	1.75	50	2.27	19	2.58	26	3.08	31	3.27	29
	邑楽町	1.07	15	1.04	10	1.05	8	1.13	9	2.16	16	2.52	24	2.88	24	3.26	28
渋川圏域	渋川市	1.15	23	1.25	21	1.44	27	1.58	35	2.59	34	2.68	28	3.15	35	3.40	36
	北橘村	1.07	14	1.13	16	1.47	30	1.55	31	2.42	25	2.83	33	2.84	20	2.92	18
	赤城村	1.11	19	1.35	31	1.49	31	1.51	24	2.85	49	2.85	36	3.30	38	4.02	55
	子持村	1.09	17	1.41	34	1.45	28	1.53	26	3.14	56	3.68	56	3.94	55	3.93	53
	小野上村	1.33	40	1.99	57	1.83	55	1.44	20	2.51	30	2.89	37	3.33	41	3.95	54
	伊香保町	1.09	18	1.61	50	1.54	39	1.52	25	2.92	53	2.69	29	3.10	32	3.51	40
	榛東村	1.66	56	1.58	48	1.99	57	2.17	58	2.64	38	3.04	42	4.26	57	4.58	56
藤岡圏域	吉岡町	1.12	20	1.12	15	1.57	43	1.71	49	2.76	45	2.84	35	3.43	49	3.33	33
	藤岡市	1.15	24	1.32	29	1.51	34	1.58	36	2.42	26	2.76	31	3.13	34	3.56	44
	新町	1.30	36	1.48	39	1.36	23	1.29	16	2.72	41	2.83	34	3.47	52	3.82	51
	鬼石町	0.68	3	0.63	2	0.78	2	0.97	4	1.89	9	1.67	2	2.38	9	2.49	8
	吉井町	1.14	21	1.24	20	1.38	24	1.50	23	2.60	35	2.46	21	2.97	28	2.89	16
	上野村	1.27	32	1.06	12	1.36	21	1.95	57	2.27	18	1.93	5	2.76	17	3.33	34
富岡圏域	神流町	1.63	55	1.59	49	1.59	47	1.59	38	2.46	28	2.74	30	2.76	18	2.78	13
	富岡市	1.32	37	1.52	42	1.58	45	1.71	48	2.47	29	2.63	27	2.91	26	3.23	26
	妙義町	1.32	39	1.29	23	1.51	33	1.64	45	2.07	15	2.48	22	3.11	33	3.42	37
	下仁田町	1.32	38	1.58	47	1.58	46	1.63	43	2.62	36	3.05	44	3.29	37	3.01	21
	南牧村	1.35	43	1.83	55	1.78	54	1.89	55	3.13	55	3.50	55	3.43	48	3.52	43
沼田圏域	甘楽町	1.54	54	1.51	41	1.40	25	1.66	46	2.78	46	2.92	39	3.26	36	3.30	30
	沼田市	1.24	31	1.45	36	1.49	32	1.60	40	2.92	54	3.23	53	3.39	45	3.43	38
	片品村	0.74	6	1.42	35	1.54	38	1.36	18	2.52	31	2.21	13	2.86	21	2.71	10
	川場村	0.89	7	0.82	6	1.19	11	1.09	7	1.04	1	1.23	1	1.28	1	1.34	1
	月夜野町	1.14	22	1.40	32	1.36	22	1.17	10	1.85	8	2.21	14	2.86	23	3.18	25
	水上町	1.67	57	1.99	58	1.93	56	1.93	56	3.94	57	4.06	57	4.11	56	4.59	57
	新治村	1.30	35	1.54	45	1.54	37	1.62	41	2.37	22	2.36	19	2.77	19	3.06	23
吾妻圏域	昭和村	1.44	50	1.62	51	1.32	18	1.32	17	2.52	32	2.90	38	2.90	25	2.97	19
	中之条町	0.69	4	0.75	3	0.86	5	0.97	3	1.68	4	1.95	6	2.18	3	2.30	5
	(吾)東村	1.38	45	1.77	54	1.00	6	1.08	5	2.45	27	2.39	20	2.93	27	2.74	11
	吾妻町	1.09	16	1.14	17	1.22	12	1.21	12	1.68	3	1.98	7	2.45	11	2.42	7
	長野原町	1.04	12	1.02	9	1.03	7	1.09	6	1.62	2	1.72	3	1.99	2	2.03	2
	嬭恋村	1.01	10	1.05	11	1.29	16	1.49	22	1.76	7	1.75	4	2.32	6	2.87	15
	草津町	0.69	5	0.82	5	0.78	1	0.73	1	1.73	5	2.05	8	2.35	8	2.09	3
	六合村	0.61	2	0.46	1	0.85	4	0.87	2	2.02	13	2.16	10	2.24	5	2.29	4
高山村	1.88	58	1.96	56	1.66	49	1.64	44	3.98	58	4.72	58	4.69	58	4.76	58	

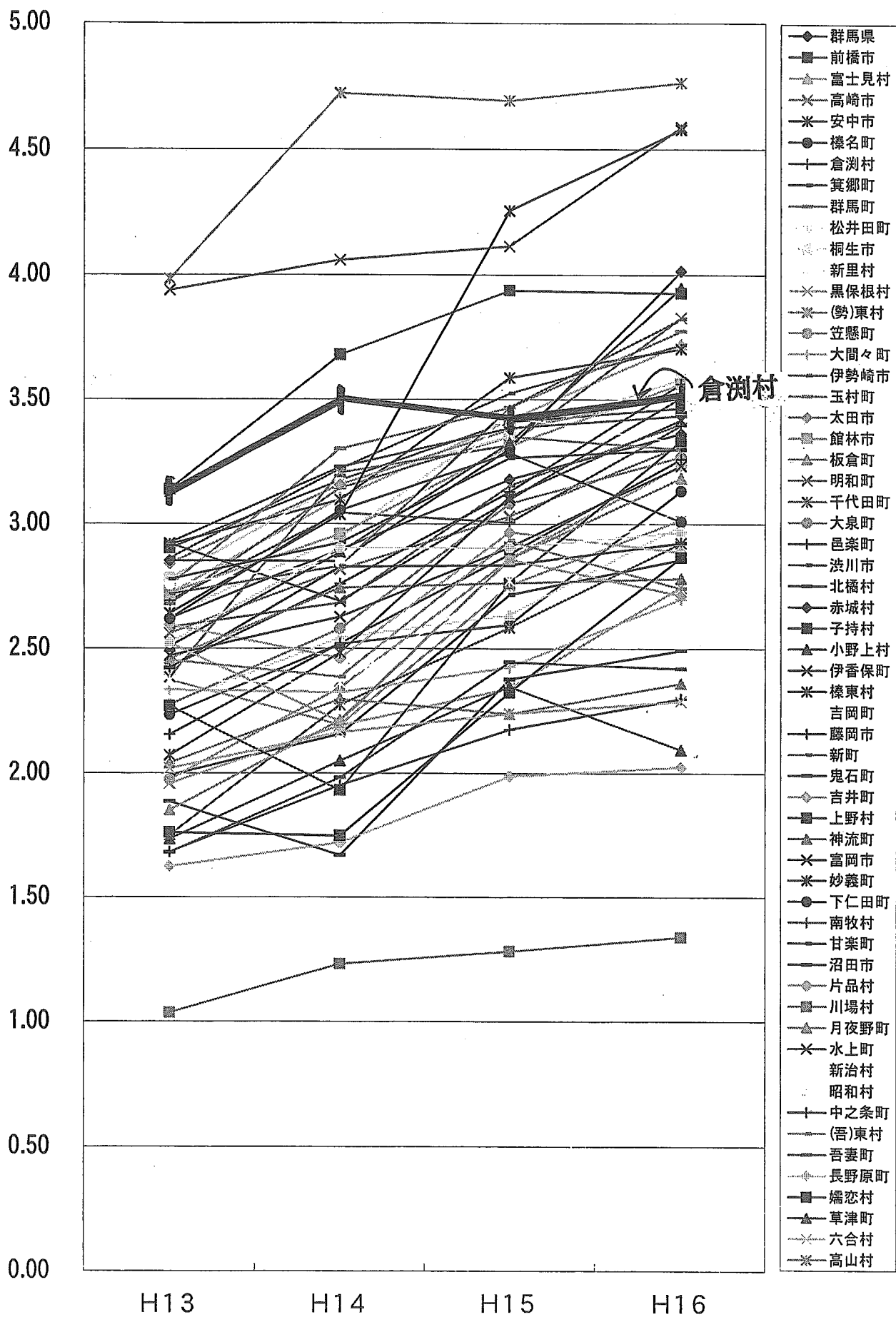
市町村別65歳健康余命の年次推移(男性)



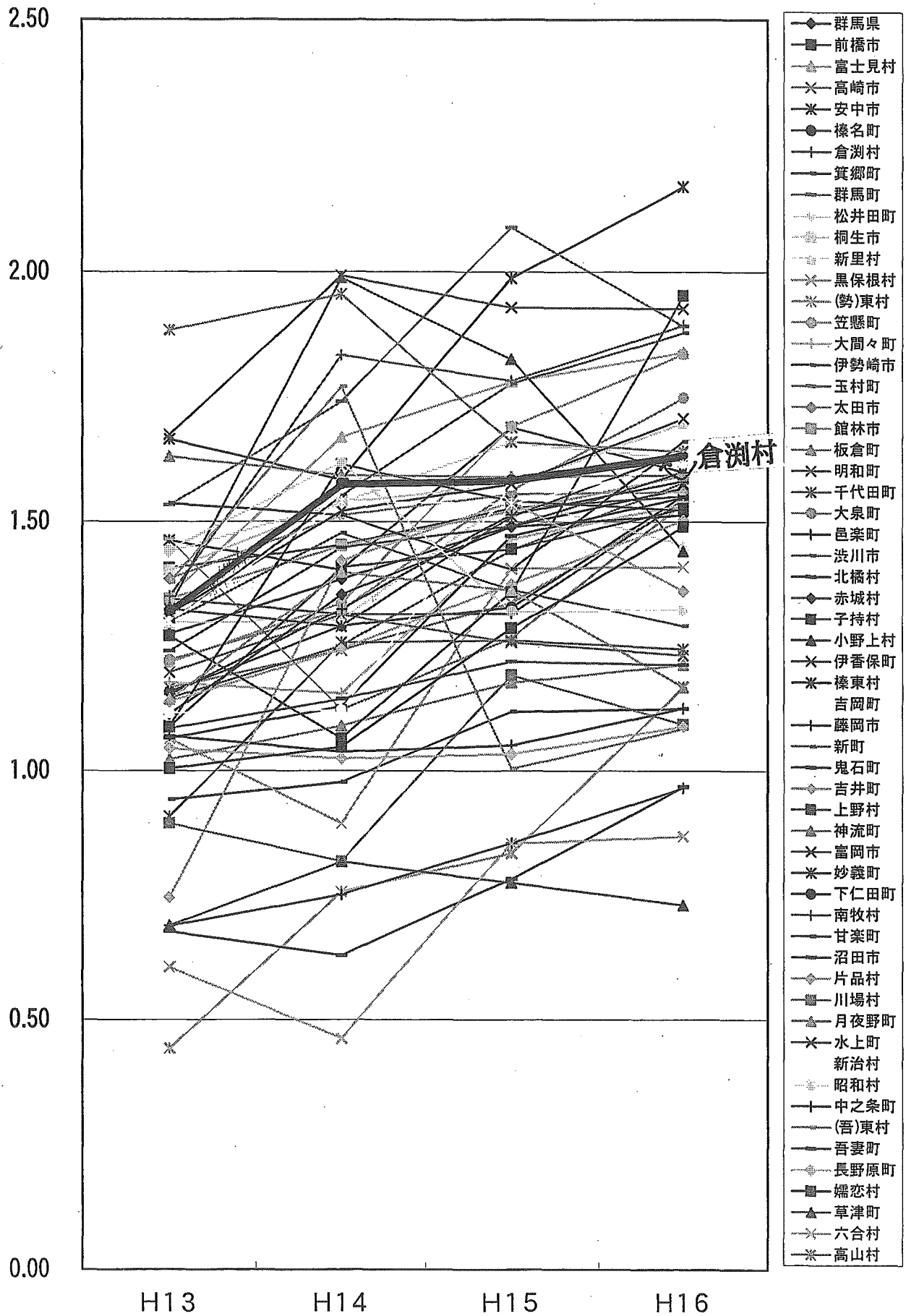
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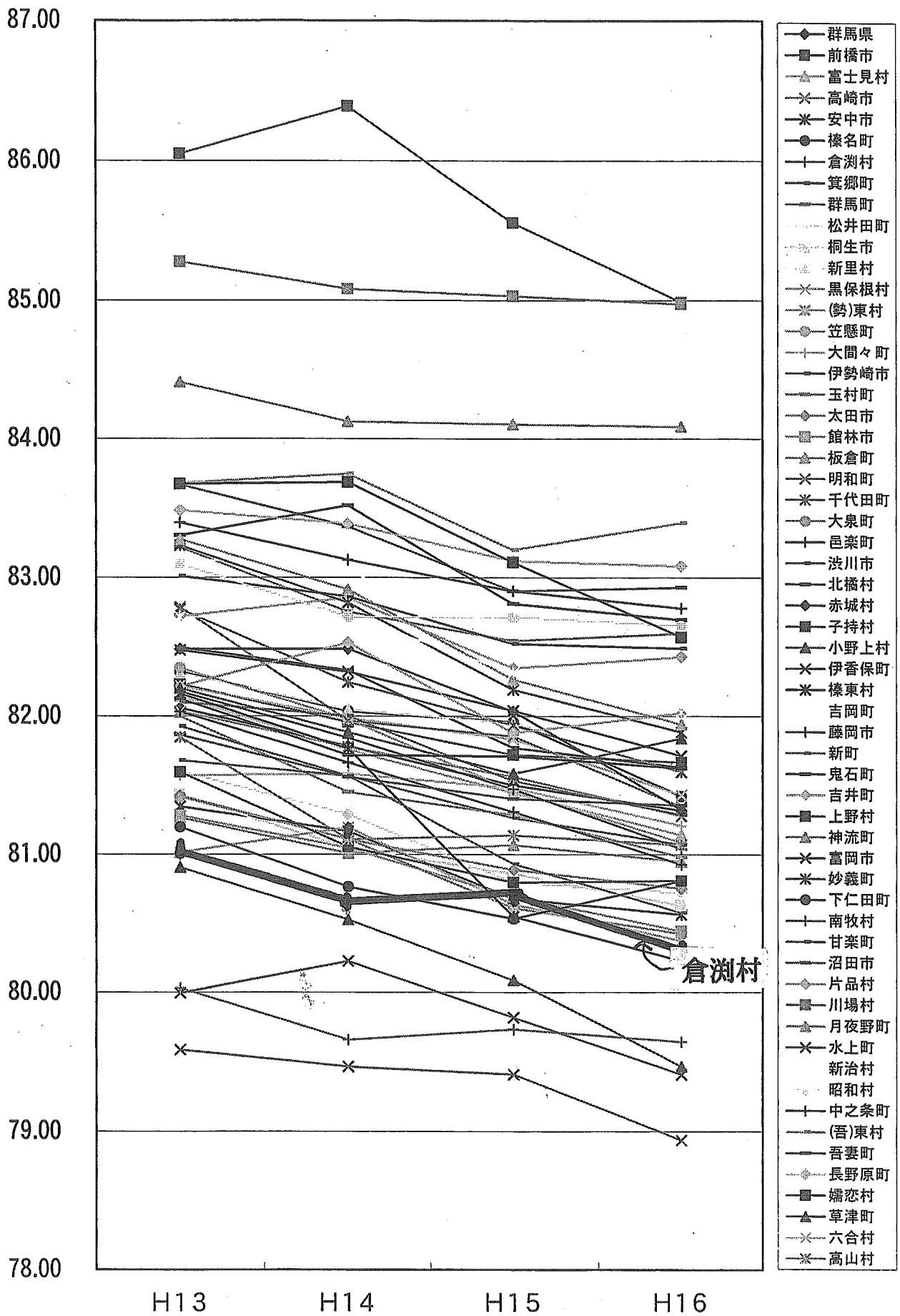
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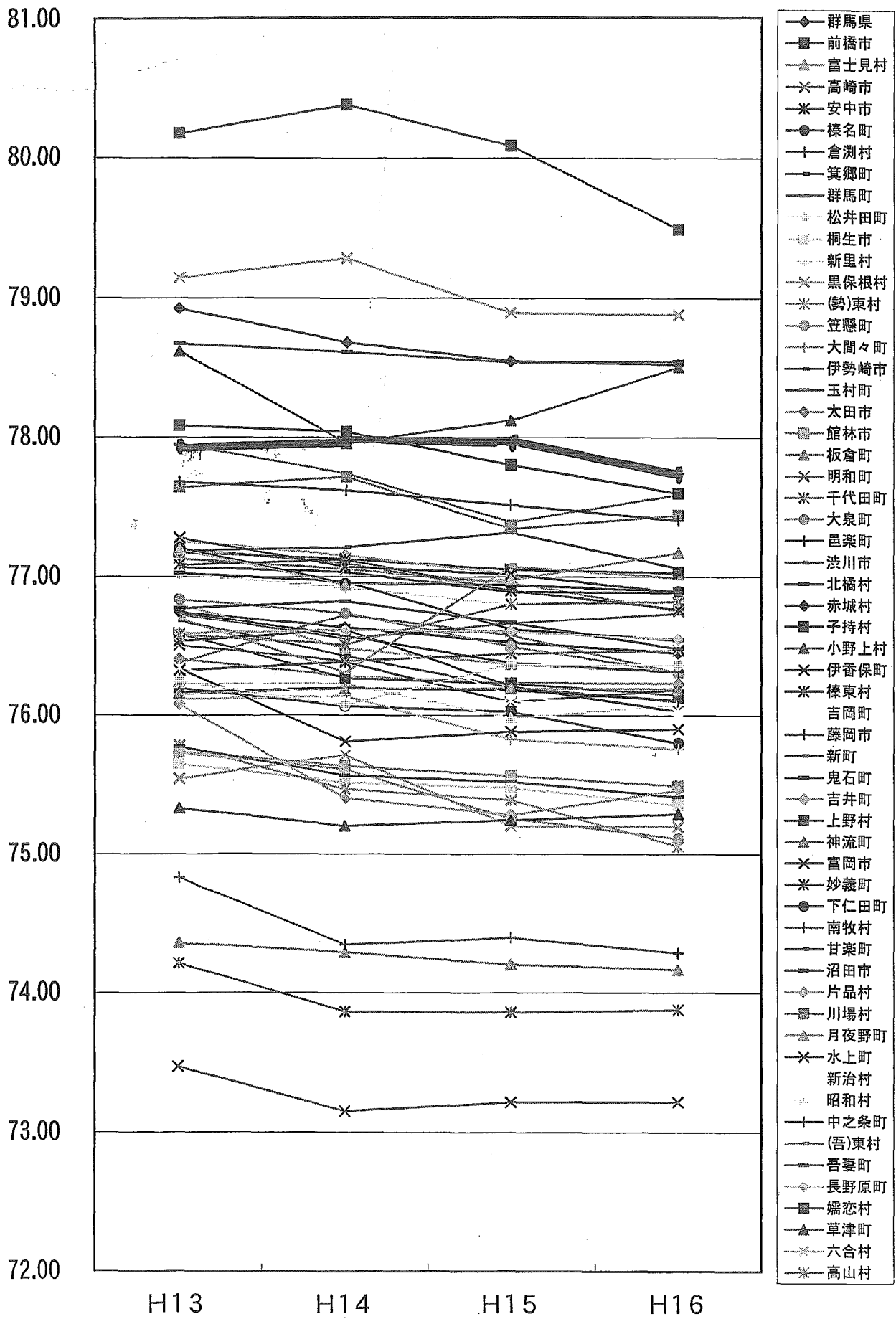
市町村別障害期間推移(男性)



市町村別健康寿命の年次推移(女性)



市町村別健康寿命の年次推移(男性)



添付資料 HUI に関する Up-Date

HEALTH UTILITIES INDEX: An Update

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The Health Utilities Index: An Update

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As many readers of Quality of Life Newsletter know the Health Utilities Index (HUI) is a family of generic health status and health-related quality of life (HRQL) measures. The family of measures includes the Health Utilities Index Mark 1 (HUI1), Mark 2 (HUI2), and Mark 3 (HUI3) systems. Each HUI measure includes a health-status classification system and a preference-based scoring formula. Although HUI1 is still used, HUI2 and HUI3 are much more frequently used both in clinical and population health studies and will be the focus of this note.

Applications of HUI require that data be collected to classify the health status of each subject at a point in time. A variety of health status questionnaires and related procedure manuals are available to facilitate the application of HUI systems. HUI has been applied by hundreds of researchers around the world.

Basic Description. HUI2 consists of seven attributes (or dimensions) of health status with three to five levels per attribute. (Detailed descriptions of HUI can be found in Feeny et al. 1995, 1996.) The levels range from highly impaired to normal. The comprehensive health state of a subject is described as a seven-element vector, one level for each attribute. The attributes in HUI2 are sensation (vision, hearing, speech),

mobility, emotion, cognition, self-care, pain, and fertility. (HUI2 was initially developed to assess outcomes among survivors of cancer in childhood. Infertility and sub-fertility are sequelae of some childhood cancers.) A multiplicative multi-attribute utility function for HUI2 translates the categorical data on health status into interval-scale single-attribute utility scores (reflecting the morbidity in that dimension of health status) and overall HRQL utility scores reflecting global HRQL (Torrance et al. 1995, 1996).

HUI3 was originally developed for the 1990 Statistics Canada Ontario Health Survey. HUI3 has eight attributes (vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain) with five to six levels per attribute. A multiplicative multi-attribute utility function and single-attribute utility functions for HUI3 have been released recently (Furlong et al. 1998).

Standardized HUI2/HUI3 Questionnaires. Questionnaires which provide sufficient information to describe the health status of a subject at a point in time in both the HUI2 and HUI3 systems have been developed. These are available in a variety of formats.

Recall Period. Standard recall periods are one week, two weeks, four weeks, and usual health (often used in long term follow-up studies and general population surveys). Customized applications such as the “previous 24 hours” have been developed to meet the needs of particular studies (for instance, peri-operative period in a surgery trial).

Mode of Administration. Self-complete and interviewer-administered versions are available.

Viewpoint. Self assessment and proxy assessment formats are available. Proxy respondents are particularly useful when patients are too young to respond on their own behalf or when their health condition attenuates the ability of subjects to provide reliable responses (Alzheimer Disease).

Algorithms. For each of the standard mode of administration formats (self-complete, interviewer-administered), there are standardized algorithms for converting responses on questionnaires into levels in the HUI2 and HUI3 systems. The use of standardized algorithms enhances the comparability of HUI data across studies. These algorithms

have been extensively tested and are well documented.

Languages. The complete family of questionnaires (n = 16) is available in Canadian English. High quality translations are available for many selected formats in French Canadian and a limited number of formats in other languages including Dutch, French, German, and Spanish. In other cases prototype translations are available. Languages into which HUI2/3 materials have been translated include Chinese (Mandarin), Danish, Dutch, Finnish, Flemish, French, German, Japanese, Malay, Norwegian, Spanish, and Swedish. Work on Portuguese and Italian translations is underway.

Why Use both HUI2 and HUI3? There is some overlap between HUI2 and HUI3. Yet, in other ways, the two systems complement each other. For instance, the concepts of emotion differ between the two systems; HUI2 refers to worry and anxiety while HUI3 to happiness versus depression. Similarly the concepts of pain differ; while both refer to the degree of severity of the pain, HUI2 focuses on the use of analgesia while HUI3 focuses on the disruption of activities. Self-care and fertility are available only in HUI2; dexterity is available only in HUI3. HUI2 has been extensively used in clinical studies, providing useful benchmark results for comparisons. HUI3 has been used in four major Canadian population health surveys, providing extensive data on population norms. Thus, in practice in clinical studies the two complement each other in major ways.

HUI3 Scoring Function. With the recent release of a multiplicative multi-attribute utility function for the HUI3 system, users are now able to generate utility scores for HUI3 health states. The HUI3 scoring function is based on preference measurements obtained from a random sample of the general population (?16 years of age) in Hamilton, Ontario, Canada. The performance of the HUI3 scoring function has been assessed extensively (see Furlong et al. 1998). For instance, the intra-class correlation coefficient between scores generated by the HUI3 scoring function and directly measured scores obtained in a separate preference survey (“out of sample”) that was conducted parallel to the survey used to estimate the HUI3 function was 0.88 (Furlong et al. 1998). Thus, there was a high level of agreement between directly measured utility scores for HUI3 health states and scores obtained using the multiplicative function.

HUI Study Groups. HUI was developed in Canada at McMaster University. Groups of researchers in other countries have formed to translate and culturally adapt HUI, and

to assess the measurement properties of the adapted instrument in their setting. Several groups are also engaged in studies to estimate multi-attribute utility functions in their own countries. Countries in which there are active HUI Groups include Austria, France, Japan, the Netherlands, Singapore, and the United Kingdom.

The Future. There are a number of ongoing studies that will provide further evidence on reliability, responsiveness, and construct validity of HUI2 and HUI3 in particular settings. Evidence on the cross-sectional and longitudinal construct validity of HUI in a variety of clinical and population health settings continues to accumulate. In some applications, special disease-specific modules have been added to HUI to enhance its descriptive power. (The additional detail on health status is not, however, incorporated into the utility scores.) These disease (or problem) specific modules need to be carefully developed and assessed. Nonetheless, such modules have the potential to combine the advantages of the focus of specific measures and the generalizability of generic measures. There is also ongoing work assessing the performance of the multiplicative HUI2 and HUI3 scoring functions. For instance, in one study directly measured utility scores for the subjectively-defined current health state of subjects and the HUI2 and HUI3 scores for their current health are being compared. Work is also underway comparing the performances of several multi-linear utility functions for the HUI3 system and the multiplicative HUI3 function.

Inquiries. Further information on HUI; a list of references on HUI; applications for the use of copyrighted HUI questionnaires, algorithms, and supporting materials; and a price list for HUI services can be obtained from:

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References:

Feeny, David, William Furlong, Michael Boyle, and George W. Torrance,
"Multi-Attribute Health Status Classification Systems: Health Utilities Index."

Pharmacoeconomics, Vol 7, No 6, June, 1995, pp 490-502.

Feeny, David H., George W. Torrance, and William J. Furlong, "Health Utilities Index," Chapter 26 In Bert Spilker, ed. Quality of Life and Pharmacoeconomics in Clinical Trials. Second Edition. Philadelphia: Lippincott-Raven Press, 1996, pp 239-252.

Furlong, William, David Feeny, George W. Torrance, Charles Goldsmith, Sonja DePauw, Michael Boyle, Margaret Denton, and Zenglong Zhu, "Multiplicative Multi-Attribute Utility Function for the Health Utilities Index Mark 3 (HUI3) System: A Technical Report," McMaster University Centre for Health Economics and Policy Analysis Working Paper No. 98-11. (To view the 98-11 abstract, click on the "CHEPA Paper 98-11" navigation button)

Information on ordering CHEPA Working Papers may also be obtained from:

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Torrance, George W., William Furlong, David Feeny, and Michael Boyle, "Multi-Attribute Preference Functions: Health Utilities Index." Pharmacoeconomics, Vol 7, No 6, June, 1995, pp 503-520.

Torrance, George W., David H. Feeny, William J. Furlong, Ronald D. Barr, Yueming Zhang, and Qinan Wang, "Multi-Attribute Preference Functions for A Comprehensive Health Status Classification System: Health Utilities Index Mark 2." Medical Care, Vol. 34, No. 7, July 1996, pp 702-722.

HEALTH UTILITIES INDEX:

An Overview

What is HUI™?

- a system for measuring health status, health-related quality of life, and producing utility scores
- generic, preference-scored, comprehensive, compact
- based on explicit conceptual framework of health status and health-related quality of life
- there are 3 versions of ™ :
 - HUI Mark1 (HUI1);
 - HUI Mark2 (HUI2);
 - HUI Mark3 (HUI3)
- each version includes a health status classification system and formula for calculating utility scores
- HUI2 and HUI3 describe thousands of unique health states
- scoring formulas are well grounded in theory and based on preference data from community surveys
- conceptual and measurement properties described in numerous papers published in peer-reviewed scientific journals and books
- to date over 300 investigators have used HUI™ in a wide variety of studies in over 20 countries world-wide
- more than 200,000 subjects have been assessed using HUI™

Uses of HUI™ ?

- to measure health-related quality of life for clinical trials
- to measure functional status for clinical studies
- to measure outcomes for cost-effectiveness and cost-utility analyses
- to measure health status for use in routine clinical practice and quality assurance programs