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An updated hip fracture projection in Asia: The Asian Federation of Osteoporosis Societies study

Ching-Lung Cheung [a, b], Seng Bin Ang [c, d], Manoj Chadha [e, f], Eddie Siu-Lun Chow [b, g], Yoon-Sok Chung [h, i], Fen Lee Hew [j, k], Unnop Jaisamrarn [l, m], Hou Ng [n, o], Yasuhiro Takeuchi [p, q], Chih-Hsing Wu [r, s], Weibo Xia [t, u], Julie Yu [v, w], Saeko Fujiwara [q, x, *]

[a] Department of Pharmacology and Pharmacy, Centre for Genomic Sciences, The University of Hong Kong, Pokfulam, Hong Kong, China
[b] The Osteoporosis Society of Hong Kong, Hong Kong, China
[c] Family Medicine Service and Menopause Unit, KK Women's and Children's Hospital, Singapore
[d] Osteoporosis Society Singapore, Singapore
[e] P. D. Hinduja Hospital, Mumbai, India
[f] Indian Society for Bone Mineral Research, India
[g] Department of Medicine & Geriatrics, Tuen Mun Hospital, Tuen Mun, Hong Kong, China
[h] Department of Endocrinology and Metabolism, Ajou University School of Medicine, Suwon, Republic of Korea
[i] Korean Society of Osteoporosis, Republic of Korea
[j] Department of Medicine, Subang Jaya Medical Centre, Selangor, Malaysia
[k] Malaysian Osteoporosis Society, Malaysia
[l] Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand
[m] Thai Osteoporosis Foundation, Thailand
[n] Department of Internal Medicine, Centro Hospitalar Conde S. Januário, Macau, China
[o] Osteoporosis Society of Macau, Macau, China
[p] Toranomon Hospital Endocrine Center, Tokyo, Japan
[q] Japan Osteoporosis Society, Japan
[r] Department of Family Medicine, Institute of Gerontology, National Cheng Kung University Hospital, Tainan, Taiwan
[s] The Taiwanese Osteoporosis Association, Taiwan
[t] Department of Endocrinology, Key Laboratory of Endocrinology of Minister of Health, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, China
[u] Chinese Society of Osteoporosis and Bone Mineral Research, Chinese Medical Association, China
[v] Section of Rheumatology, Department of Medicine, University of Santo Tomas Faculty of Medicine and Surgery, Espana, Manila, Philippines
[w] The Osteoporosis Society of the Philippines Foundation, Inc, Philippines
[x] Health Management & Promotion Center, Hiroshima Atomic Bomb Casualty Council, Hiroshima, Japan

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ABSTRACT

Objectives: Hip fracture is a major public health problem. Earlier studies projected that the total number of hip fracture will increase dramatically by 2050, and most of the hip fracture will occur in Asia. To date, only a few studies provided the updated projection, and none of them focused on the hip fracture projection in Asia. Thus, it is essential to provide the most up to date prediction of hip fracture in Asia, and to evaluate the total direct medical cost of hip fracture in Asia.
Methods: We provide the updated projection of hip fracture in 9 Asian Federation of Osteoporosis Societies members using the most updated incidence rate and projected population size.
Results: We show that the number of hip fracture will increase from 1,124,060 in 2018 to 2,563,488 in 2050, a 2.28-fold increase. This increase is mainly due to the changes on the population demographics, especially in China and India, which have the largest population size. The direct cost of hip fracture will increase from 9.5 billion United State dollar (USD) in 2018 to 15 billion USD in 2050, resulting a 1.58 fold increase. A 2%–3% decrease in incidence rate of hip fracture annually is required to keep the total number of hip fracture constant over time.

* Corresponding author. Health Management & Promotion Center, Hiroshima Atomic Bomb Casualty Council, Hiroshima, Japan.
E-mail addresses: s-fujiwara@gentaikyo.or.jp, saeko737@gmail.com (S. Fujiwara).
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Conclusions: The results show that hip fracture remains a key public health issue in Asia, despite the available of better diagnosis, treatment, and prevention of fracture over the recent years. Healthcare policy in Asia should be aimed to reduce the burden of hip fracture.

1. Introduction

Osteoporotic fracture is a major public health problem that is known to be associated with increased dependency, morbidity, and mortality. Among all osteoporotic fracture, hip fracture incurs the greatest morbidity, mortality, and costs. Studies by Cooper et al. [1] and Gullberg et al. [2] in 1990s projected that approximately 4.50–6.26 million of hip fractures will occur worldwide by 2050, where half of them will occur in Asia. Thus, a huge effort, including improve diagnosis and medications, various fracture prevention programmes, and research, has been undertaken to reduce the incidence of fracture worldwide.

Multiple studies have shown that incidence of hip fracture has been stabilized or reduced slightly in many countries or cities, such as Spain [3], Japan [4], United States [5], France [6], Taiwan [7], and Hong Kong [8]. However, this might not be the case for some countries, such as China [9,10] and Korea [11,12]. On the other hand, life expectancy worldwide has increased by 5 years in the last 15 years, according to the World Health Organization [13]. This implies that the total number of hip fracture may be continue to rise with the changing demographics, despite the decrease in the incidence of hip fracture reported in some countries. Therefore, we aim to provide the best estimate of hip fracture in Asia using the most updated information, and to evaluate the total direct medical cost of hip fracture in Asia.

2. Methods

2.1. Data sources

Data on incidence rate of hip fracture was obtained from 9 Asian Federation of Osteoporosis Societies (AFOS) members, including China [14,15], Hong Kong [16], India [17], Japan [18,19], Korea [20], Malaysia [21], Singapore [21], Taiwan [22,23], and Thailand [24] (Table 1). For Taiwan, we noted that a large difference in the incidence of hip fracture were estimated by two studies, due to Chie et al. [22] and Wang et al. [23] used International Classification of Diseases (ICD), 9th revision (ICD-9) of 820.XX (proximal femur fracture) and 820.XX to 821.XX (other femur fracture) to define hip fracture, respectively. To be conservative, we included both studies in the estimation of the total number of hip fracture. Only publications using nationwide or big databank that provided age-specific incidence of hip fracture between ages 50 and $\geq$ 80 years were included. Such decision provides a more accurate projection and accounts for a more realistic impact on total numbers of hip fractures due to change in the population demographics. Since 2 sets of hip fracture data were available for China, Japan, and Taiwan, the mean of the two estimates was used.

Similarly, direct costs of hip fracture were obtained from publications and available government data (Table 2) from China [25],

Table 1
Incidence rate of hip fractures in 9 Asian Federation of Osteoporosis Societies (AFOS) members.

AFOS members [reference]	Definition of hip fracture	Year of data[a]	Sex	Incidence in specific age group (per 100,000 person-years)						
				50–54	55–59	60–64	65–69	70–74	75–79	≥80
China [15]	ICD10: S72.002, S72.0052 for cervical fracture and S72.101,S72.1051, S72.1052, S72.2051 for trochanteric. Subtrochantericfractures (S72.2051) were included in the groupof trochanteric fractures.	2010	Male	44.0	48.0	46.0	65.0	126.0	237.0	557.4
			Female	23.8	32.6	92.3	167.1	248.3	382.0	672.1
China [14]	"cervical fracture" or "trochanteric fracture".	2015	Male	36.8	60.8	57.1	86.6	114.5	234.8	236.0
			Female	23.8	32.6	92.3	167.1	248.3	382.0	416.5
Hong Kong [16]	(ICD-10) S72.0–S72.2 (fracture of femoral neck)	2000–2004	Male	12.0	25.0	51.0	102.6	212.2	450.0	1210.8
			Female	8.8	23.6	68.0	156.0	364.4	830.8	2174.3
India [17]	Fracture of the proximal femur (ICD-10: S72.0-72.2	2009	Male	79.0	83.0	72.0	90.0	101.0	338.0	447.4
			Female	85.0	110.0	103.0	161.0	165.0	441.0	377.5
Japan [19]	Not mentioned	2012	Male	22.3	22.3	50.3	50.3	168.8	168.8	723.0
			Female	31.3	31.3	86.6	86.6	367.1	367.1	1860.8
Japan [18]	All fractures were categorized as either neck or trochanteric (including subtrochanteric).	2015	Male	7.1	12.1	38.1	62.0	90.3	141.8	496.9
			Female	28.6	33.9	61.3	62.6	165.6	308.4	1313.7
Korea [20]	ICD-10 diagnostic code: fracture of the neck of the femur [S72.0, S72.00], pertrochanteric fracture [S72.1, S72.10]) and hip fracture-related operation (open reduction & internal fixation [ICD-10 procedure code: N0601], closed reduction and percutaneous fixation [N0991], total hip replacement [N0711], or hip hemiarthroplasty [N0715])	2002–2004	Male	8.0	19.0	41.1	69.4	125.7	211.4	405.2
			Female	5.4	19.3	43.9	92.6	187.0	332.8	629.9
Malaysia [21]	NA	1997–1998	Male	13.8	20.1	37.6	58.3	96.5	320.0	320.0
			Female	9.2	26.5	48.2	103.0	230.0	644.0	644.0
Singapore [21]	NA	1997–1998	Male	22.0	34.5	48.6	98.6	210.0	611.0	611.0
			Female	14.1	34.0	81.1	195.0	408.0	1369.0	1369.0
Taiwan [22]	ICD 9: 820	1996–2000	Male	36.0	50.0	87.0	149.0	284.0	542.0	1141.7
			Female	22.0	45.0	93.0	215.0	459.0	934.0	1965.5
Taiwan [23]	ICD 9: 820-821	2013	Male	182.0	182.0	324.0	324.0	838.0	838.0	2675.0
			Female	167.0	167.0	428.0	428.0	1553.0	1553.0	4870.0
Thailand [24]	femoral neck or an intertrochanteric fracture	2006	Male	12.4	26.8	62.1	73.5	164.6	222.7	798.0
			Female	25.9	32.7	83.2	158.1	388.8	793.4	1305.6

[a] Year of data indicates the year that the incidence data was estimated. It is not the year of publication.

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