

## GENERAL ORTHOPAEDICS

# Current status of Asian joint registries: a review

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- A comprehensive overview of current Asian joint arthroplasty registries, highlighting their strengths and weaknesses and providing a case for establishing registries nationwide, is given. Pertinent information required for the future establishment and improvement of Asian joint arthroplasty registries is given.
- Six registries in Asia were identified, with three, Indian Joint Registry, Japanese Orthopaedic Association National Registry and Pakistan National Joint Registry having developed official websites and published annual reports.
- The majority of both hip and knee surgeries in India and Pakistan were carried out on men, in contrary to Japan, where the majority of knee surgeries were conducted in women.
- Osteoarthritis was the primary indication for knee surgery, whereas osteonecrosis was the main indication for hip surgery in India and Pakistan, compared to osteoarthritis in Japan.
- Many countries in Asia have attempted to report data on joint arthroplasties, though little information on nationwide registries is available, with three countries – Japan, India and Pakistan – having made their joint registry data available to the public.

Keywords: hip; knee; joint; arthroplasty; registry; Asia

## Introduction

Joint arthroplasty surgery is the most utilised and most successful method to address joint arthritis (1). The number of total hip and total knee arthroplasty (TKA) surgeries performed has increased exponentially in recent years due to an ageing population. In Europe alone, around 820,000 hips and 560,000 knees were implanted in 2012, versus 745,000 hips and 430,000 knees in 2005, representing a 10% increase in less than 10 years (1). Total hip arthroplasty has been named 'The operation of the Century' due to its high success rate, long survivorship and satisfactory clinical outcome (2). The success of joint arthroplasty surgeries has been made possible through thorough research encompassing fields such as biomaterials, mechanical engineering and medical physics (3). But up until the early 1970s, knowledge of joint arthroplasty implants and choice of

its use has been based on low-quality retrospective case series, often reported by the implant designers or manufacturers themselves (4). These published reports have been limited by reporting biases, and since they do not include longer-term follow-up, the reports cannot provide a comprehensive review of the performance of the joint arthroplasty prosthesis within a population (4). This lack of long-term outcome information has led to the call for the establishment of co-ordinated arthroplasty registries, with the first nationwide registry developed in the 1970s in Sweden. The Swedish Knee Arthroplasty Register was initiated in 1975, with the Swedish Hip Arthroplasty Register beginning in 1979 (5, 6). These joint arthroplasty registries were established to systematically collect data including patient demographics, procedures, implant

choice, surgical outcomes with revision as the endpoint, among other information, and had a national or geographical regional coverage (7).

These broad coverage of data collection have allowed efficacious medical device post-market surveillance in a much more coordinated and complete manner than individual cohort studies, as the revision risks of joint arthroplasty are typically a few percent or less within the first 5–10 years and very large numbers of patients are required to identify failing implants early on (7). The importance of joint arthroplasty registries was illustrated when the identification of excessively high revision risks of the metal-on-metal articular surface replacement (ASR) resurfacing and ASR XL acetabular system implants by the Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR), and subsequently by other national registries, led to the recall of the ASR implants worldwide (8). Many countries and regions have developed their own registries to identify and understand their population-specific arthroplasty performance and revision risk. However, such national registries have mainly been established in Western countries, including the United Kingdom, Australia, Sweden and other countries in Europe, where the populations are not reflective of populations living in Asia or other parts of the world (9, 10).

Many arthroplasty designs currently in use are based on Caucasian anthropometric parameters that are known to be different from Asian ones (11). For example, it has been reported that Chinese and Korean individuals have a more pronounced asymmetrical tibial plateau compared to Caucasians, and that the tibial baseplates of TKA designed for more symmetrical Caucasian knees may not always be suitable for an Asian individual (12, 13). Similarly, the patella in Asian persons is thinner and smaller compared to Caucasians, and there is a higher risk of fracture if conventional Caucasian patellar prostheses are used (12). This risk has led to many Asian surgeons preferring not to resurface the patella (14). However, as identified in registries that are composed mainly of data collected from a Caucasian population, not resurfacing the patella is associated with a higher risk of revision due to residual anterior knee pain, which is uncommon among Asians (14, 15). Clearly, the anthropometric difference between Caucasians and Asians would make the registries consisting mainly of data from a Caucasian population not the best option to predict joint arthroplasty performance in Asian individuals.

There is therefore a legitimate need for the establishment of Asian registries to systematically document the performance of various joint arthroplasty prostheses, and to review and track the suitability and outcomes of these prostheses in Asian populations.

The breadth and depth of arthroplasty registries in Asia are currently limited and interpretation of information from these registries is further constrained by the

unavailability of data (to the public). Overall, this paucity of information has hindered the advancement of joint arthroplasty care and research in Asia and a review of the status of Asian registries and available information would help researchers to identify current knowledge gaps and deficiencies in this area and better plan for future improvement and development of Asian joint arthroplasty registries to enable better targeted healthcare. Despite the critical role of registries in improving arthroplasty outcomes, there has been limited consolidation and analysis of data from Asian registries. Here, we provide a comprehensive review of current Asian joint arthroplasty registries, highlighting their strengths and weaknesses, and provide the foundation information to pave future establishment and improvement of Asian joint arthroplasty registries in countries which currently lack such information.

## Methods

This is a narrative review on the current status of nationwide joint arthroplasty registries in Asia. A search was conducted on PubMed, Scopus, Google and individual joint registry websites and the related medical societies of each country. To our knowledge, this is the first comprehensive narrative review to map out the contemporary status of Asian Joint Replacement Registries, including those established in South Asia, South-east Asia, Central Asia, East Asia and Western Asia. A broad search on Google, PubMed and Scopus using the keywords 'joint registry Asia', without limits on language or date, was conducted. This search strategy yielded information on six Asian arthroplasty registries.

A more in-depth and specialised search relating to each of the registries was then performed using PubMed and Scopus, with the aim to find any research papers that had been published between 2006 and 2023 using any of the registries established in Asia. The year 2006 was selected as a search limit for the earliest year, as this was the first year after national arthroplasty registries in Asia were founded. Both the Indian Joint Registry and Japanese Joint Registry were established in 2006. The search was conducted with keywords in English using Boolean operators, as follows, on both search engines, PubMed and Scopus: ('arthroplasty registry' OR 'joint registry' OR 'knee registry' OR 'arthroplasty database' OR 'joint database' OR 'joint arthroplasty registry' OR 'knee arthroplasty registry' OR 'hip registry' OR 'hip arthroplasty registry' OR 'joint arthroplasty database' OR 'hip database' OR 'hip arthroplasty database' OR 'knee arthroplasty database') AND (Asia OR India OR Pakistan OR Japan OR Saudi Arabia OR Iran OR Taiwan).

Searching for 'joint registry' and the name of the country on Google yielded a total of four arthroplasty registries. After an extensive search, three of these registries were found to have published publicly accessible annual reports. Annual reports are published by these joint

registries on their official websites, which provide a summary of data collected by the registry every year. More advanced analyses included in some registries include Kaplan–Meier estimates for survival analysis and prosthesis failure incidence rates. The information from annual reports forms the basis of this narrative review. The searches were conducted by two authors independently and the information was then checked by a third author. The search terms used were agreed upon by all authors.

## Results

A total of six registries in Asia were identified from the search on PubMed, Scopus and Google. Only three – Indian Joint Registry, Japanese Orthopaedic Association National Registry and Pakistan National Joint Registry – have developed official websites and published annual reports. The other three registries are Taiwan's National Joint Arthroplasty, Saudi Arabia Arthroplasty Registry and Iranian Joint Registry.

Due to a reform in 2019, the original Japan Arthroplasty Register was combined with other orthopaedic surgical procedures to form the Japanese Orthopaedic Association National Registry. Therefore, annual reports of 2 years, 2020 (16, 17) and 2021 (18, 19) were published, which made a total of eight reports for knee and hip arthroplasty from this registry.

The Indian Joint Registry produced a newsletter in 2019 (20) and a PowerPoint presentation of registry information in 2021 (21), reporting pertinent annual data on knee and hip arthroplasty and regarded as annual reports. The Pakistan National Joint Registry has published six annual reports since the inception of the registry, with the most updated in 2019. No reports have been published since the COVID-19 pandemic.

As reflected from the latest data available for each registry, 2,346 institutions in Japan (2022) and 108 hospitals in

Pakistan (2019) were registered to provide real-time information on orthopaedic surgery to the registry. No information regarding the number of institutions/hospitals in India contributing to their registry is provided.

Table 1 outlines the basic information of the three included registries, while Supplementary Table S1 (see section on [Supplementary materials](#) given at the end of the article) shows the variables extracted from data entry forms available on the official website of each registry.

## Primary total hip arthroplasty surgery

Supplementary Table S2 shows the accumulated frequency and patient demographics of primary hip arthroplasty surgery. Note that the years of foundation of each registry are different, which has compounded the difficulties when comparing figures. Over the lifetime of registries, 20,288 in India (2006–2018), 3,841 in Pakistan (2014–2019) and 128,824 in Japan (2020–2021) primary hip procedures were documented.

Supplementary Table S3 illustrates the trend of primary hip arthroplasty surgery frequency by year. The Indian Joint Registry showed a steady rise in the frequency of procedures per year from 83 in 2006 to 2,502 in 2017 and a subsequent drop from 2,180 in 2018 to 216 in 2021. The sudden decline in procedures recorded in around 2018 is of concern and might be attributed to the lack of reporting or missing data. The COVID-19 pandemic period caused profound disturbance to the healthcare system and may explain the abrupt downturn in the number of orthopaedic surgeries performed in the later years.

The Pakistan National Joint Registry recorded a growing trend in the frequency of primary hip arthroplasty surgeries from 317 in 2014 to 930 in 2019, the latest available data.

A slight increase was seen in the frequency of primary hip arthroplasty procedures from 60,049 in

**Table 1** Basic background information of Asian arthroplasty registries.

Name of the registry	Organisation	Starting year	Procedures recorded	Annual reports, <i>n</i>	Last update to annual report
Indian Joint Registry	Indian Society of Hip & Knee Surgeons	2005	Knee and Hip Arthroplasty	2	2019–2021
Japanese Orthopaedic Association National Registry	Japan Seikei Association	2006	Knee, Hip and shoulder Arthroplasty, Knee Arthroscopy and Sport Medicine Arthroscopic Surgery, Spine Surgery and surgery of fracture (forearm, lower leg, upper arm, clavicle, patella, hand and foot)	8	2021–2022
Pakistan National Joint Registry	Pakistan Arthroplasty Society	2014	Knee and Hip Arthroplasty	6	2019–2020
Taiwan's National Arthroplasty Registry	Ministry of Health and Welfare	2016	Knee and Hip Arthroplasty	0	---
Saudi Arabia Arthroplasty Registry	Saudi Orthopaedic Association	---	---	0	---
Iranian Joint Registry	---	---	Knee and Hip Arthroplasty	0	---

2020 (1st April 2020–31st March 2021) to 68,775 in 2021 (1st April 2021–31st March 2022) in the Japanese Orthopaedic Association National Registry.

## Demographics of primary total hip arthroplasty surgery by gender, age and BMI

As shown in Supplementary Table S2, the majority of primary hip surgeries were carried out on men for the Indian and Pakistani populations, whereas in Japan, women were the main patients of primary hip arthroplasty.

The mean age for men and women in India at primary operation was 49.6 and 55.1 respectively. Bukhari *et al.* (22) reported that Pakistani patients undergoing primary operation were at a similar mean (SD) age 50.7 (15.4), while the official Pakistani registry annual report described age distribution in three groups: 45.65% aged <50, 51.78% aged 51–80 and 2.57% aged >80 for the previous 6 years (2014–2019). Age distributions at primary operation were reported in Japan, which produced a mean age of 63.77, with 60 and 70 as the major age groups for primary hip arthroplasty.

The median BMI for men and women in India at primary operation was 25.35 and 25.97 respectively, while Pakistani patients had a higher mean (SD) BMI of 26.3 (6.9). No information on BMI was reported in the Japanese annual reports.

## Indications for primary total hip arthroplasty surgery

Supplementary Table S2 also shows that secondary osteoarthritis was the major indication for surgery performed in Japan, while in India and Pakistan osteonecrosis/avascular necrosis were the most common indications. Otherwise, the Asian registries shared a similar spectrum of indications including primary osteoarthritis, inflammatory-type arthritis (rheumatoid arthritis, ankylosing spondylitis, inflammatory arthritis) and trauma.

## Fixation and bearing surfaces of primary total hip arthroplasty

Each registry reported the percentage of primary hip arthroplasty by each fixation method. Cementless primary total hip arthroplasty was most often used across India, Pakistan and Japan. Although utilisation of cemented hip arthroplasty was favoured in Pakistan from 2014 to 2016 after which this method was surpassed by cementless fixation. Since then, there has been a growing

trend of increased utilisation of cementless hip arthroplasty. The percentages of cementless fixation in 2020 and 2021 did not undergo many changes in Japan (Supplementary Table S3).

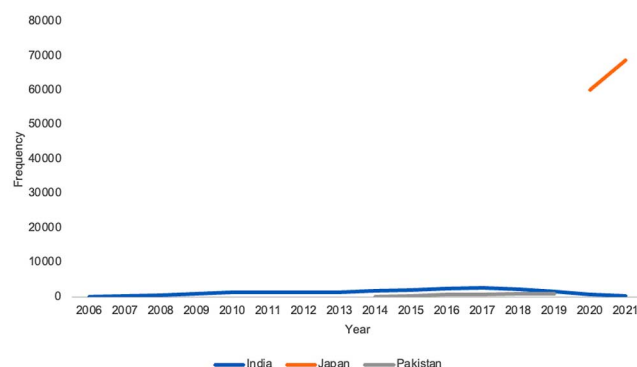
The Indian and Pakistani registries reported the frequency of use of dual-mobility bearings, while only 2.8% of surgeries in India used such bearings, 7.0% of the surgeries performed in Pakistan used them. It is also noted that the Pakistan National Joint Registry was the only Asian registry reporting the frequency of primary total hip arthroplasty surgery by bearing surfaces, with metal on standard polyethylene as the most common type.

## Total frequency and demographics by gender and age of revision hip arthroplasty

Over the lifetime of the registries, 1,306 in India (2006–2018), 555 in Pakistan (2014–2019) and 6,507 (2020–2021) in Japan revisions of a hip arthroplasty have been linked to a previous hip arthroplasty. The trend of revision THA frequency by year follows a similar trend as that of primary THA in all registries (Fig. 1) (Supplementary Table S2).

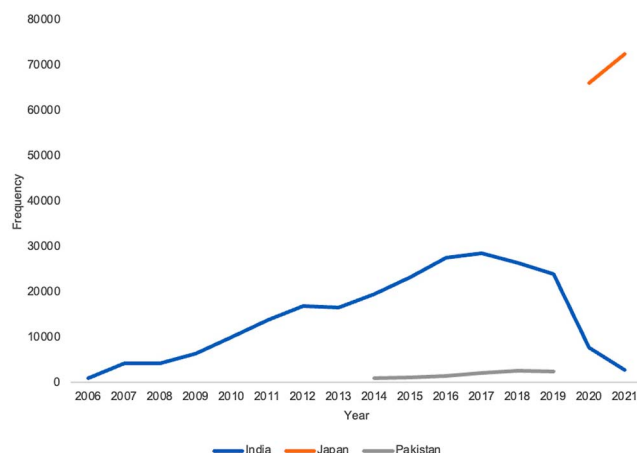
The majority of revision THA was carried out on women among Japanese patients and on men among Pakistani patients. These figures are not surprising as it follows the gender proportion of primary THA. No data on gender have been reported in the Indian Joint Registry. The Japanese Orthopaedic Association National Registry is the only Asian registry illustrating the age distribution of revision, with patients aged 70 making up the major age group at revision (Supplementary Table S2).

Aseptic loosening is the most common indication for revision in all three registries for THA, and this is further classified based on anatomical sites (e.g. acetabulum and femur) in the Japanese Orthopaedic Association National Registry and Pakistan National Joint Registry, with acetabulum being more commonly seen. Infection,



**Figure 1**

Trend of primary hip arthroplasty surgery frequency by year.

**Figure 2**

Trend of primary knee arthroplasty surgery frequency by year.

fracture and dislocation/instability were the next most common reasons for revision requirement in all three registries.

### Primary TKA surgery

Supplementary Table S4 shows the accumulated frequency of primary TKA. Over the lifetime of the Indian Joint Registry, from 2006 to 2021, 232,919 primary knee procedures were documented, while in Pakistan, from 2014 to 2019, the total was 11,020. The two annual reports of the Japanese Orthopaedic Association National Registry of 2020 and 2021 reported 138,799 procedures.

Figure 2 illustrates the trend of primary knee arthroplasty surgery frequency by year. The Indian Joint Registry reported a steady rise in the frequency of procedures per year from 1,022 in 2006 to 29,034 in 2017 and a subsequent drop from 26,460 in 2018 to 2,740 in 2021. The decline was similar to that seen in primary THA and might be attributed to the same reason. Figures shown in the Pakistan National Joint Registry demonstrated an increasing frequency of primary TKAs from 1,046 in 2014 to 2,384 in 2019.

### Demographics of primary TKA by gender, age and BMI

The majority of primary TKA procedures were carried out on women for all Asian registries. As the Indian registry did not present sufficient data on gender distribution across the years, for consistency, only data from the latest year on gender proportion for the other two registries are presented (Supp. Table S4).

The Indian annual report showed the mean age for men and women in India at primary operation. The Pakistan annual report described the age group distribution in three groups: 20.60% aged <50, 77.75% aged 51–80 and 1.65% aged >80 for the past 6 years (2014–2019), while the Japanese annual report showed the age distribution at primary operation, with age 70 as the major age group requiring primary knee arthroplasty.

The Indian annual report of 2020 showed the median BMI for men and women in India at primary operation was 27.43 and 29.21 respectively. Bukhari *et al.* (22) showed that Pakistani patients had a higher mean ( $\pm$ SD) BMI 30.5 ( $\pm$ 7.48), while no information on BMI was recorded in the Japanese annual reports.

### Indications for primary TKA surgery

Osteoarthritis was given as the major documented indication for surgery performed in all three registries and Charcot arthropathy was presented as a unique focus in the Japanese Orthopaedic Association National Registry (Supplementary Table S4).

### Fixation, level of constraints of primary TKA

Supplementary Table S4 gives the breakdown of cases by type of TKA, fixation methods, level of constraints, bearing used and built-in flexion. Cement fixation was the most common type for both India and Japan. Note that the Indian Joint Registry did not report data on hybrid fixation. Based on cement and hybrid fixation, Japan further recorded the use of antibiotics during the procedures. Posterior stabilisation was the surgeons' preference in both India and Pakistan. The Pakistan National Joint Registry was the only Asian registry illustrating the use of bearing and built-in flexion. Fixed bearing and standard flexion were the dominant types respectively.

### Total frequency and demographics by gender and age of revision knee arthroplasty

Over the lifetime of the registries, 1,557 in India, 432 in Pakistan and 5,364 in Japan revisions of a knee arthroplasty have been linked to a previous knee arthroplasty. The trend of frequency and gender distribution of revision by year shares a similar pattern as that of primary TKA in all registries. The majority of revision knee arthroplasty were carried out on women among Japanese patients and Pakistani patients. No data on gender proportion were reported from the Indian Joint Registry. The Japanese Orthopaedic Association National Registry is the only Asian registry illustrating the age distribution of revision (Supplementary Table S4).

Supplementary Table S4 also shows the stated indication for revision TKA. Aseptic loosening and infection were the most common indications for revision in all three registries. Aseptic loosening was further classified based on anatomical sites e.g. tibia, femur, patella in the Japanese Orthopaedic Association National Registry and Pakistan National Joint Registry, with tibia as the more commonly cited reason. Instability was the next prominent reason for revision for all three registries.

## Implant brands

### Knee surgery

Due to the advent of indigenous brands, the spectrum of implant brands varied moderately among the registries. Nonetheless, international companies such as Depuy Synthes/Johnson & Johnson MedTech, Zimmer Biomet and Smith & Nephew dominated the market in all three countries. Meril Life Sciences, an indigenous Indian brand, took up 25.1% of India's market (Supplementary Table S5).

### Hip surgery

The distribution of implant brands for primary hip arthroplasty is also given in Supplementary Table S5. The spectrum of brands between Japan and Pakistan were relatively divergent. Market share in Japan was dominated by Zimmer Biomet and Stryker, while Surgival and UNITED were dominant in Pakistan.

## Discussion

This is the first narrative review to study the status of joint registries in Asia. With the aim of promoting trans-national collaboration in the Asia-Pacific region, providing a platform for identifying areas for improvement in the existing Asian joint registries and providing a framework for any countries that have not established a nationwide joint registry, all the Asian joint registries were searched to ascertain available data and reports. Common variables presented by each registry from annual reports and manuscripts were collated and presented in this review. Due to the marked impact of the COVID-19 pandemic, there was a halt in publication of annual reports and relevant research in India and Pakistan.

This narrative review has revealed a substantial knowledge gap in knee and hip implant surgeries conducted in Asia, especially when compared to data shown in well-established joint registries e.g. Sweden, the United Kingdom and Australia. Very few manuscripts have been published using data from registries established in Asia and published manuscripts are mostly commentaries on data presentation rather than investigation of clinical problems (22, 23, 24, 25, 26). Despite the Indian and Pakistani registries taking

16 and 8 years to establish, the number of registered procedures was significantly exceeded by the Japanese registry, which was operational for only 2 years. It is noted that both countries have larger populations than Japan, which reflects limited registry coverage. On the other hand, Asian registries lack data stratification and are now optimising by collecting additional information about the procedures, implants and patient outcomes. Despite the existing model from Western countries, to date there are still questions about what data should be collected. Different preferences of procedures, healthcare systems, implant companies and other reality determinants could make a simple clone impractical. In addition to the registry's short history, the registry lacks the representativeness and breadth of data to produce conclusive evidence.

The degree of development of a registry can be judged by the administrative protocols and technology used in the data collection. The Indian Joint Registry experienced a reform in incorporating more details e.g. component-wise details of company, post-operative modality in reducing pain and venous thromboembolism into the data entry form. The Japan arthroplasty registry was incorporated into a larger database that assembled the information of all orthopaedic surgery procedures in Japan. The changes were associated with more efficient procedures by using barcode technology and more concise data collection. On the other hand, the Pakistan National Joint Registry actively sought collaboration and partnership with international organisations and other national joint registries. Their annual reports showed constant improvements in data entry. Thus, there have been continuous improvements and changes seen in Asian joint registries.

The need for Asian countries to build nationwide joint registries is irrefutable. Most of the well-established national joint registries are situated in Western countries, which conduct research based on Caucasian populations. The anatomical variations of ethnicity, socioeconomic factors and healthcare system differences make research conclusions based on Caucasian populations inapplicable to Asians. As an example, Lai *et al.* (27) showed that the indication for primary THA was proven different between Caucasian and Han Taiwanese in 2008, and that as opposed to osteoarthritis in Caucasians, avascular necrosis is the most common indication in Han Taiwanese. Our results also showed that some variables were different between Asians and Caucasians. The majority of primary hip arthroplasty were carried out in men among Indians and Pakistanis. The 2023 NJR Annual Report (UK) (28) and the 2022 Annual Report of the Swedish Arthroplasty Register (29) showed that women were the major gender undergoing primary hip arthroplasty surgeries. In addition, the Asian registries presented here showed that the mean/median age at primary THA was 63.77 in Japan and 50.7 in Pakistan, while UK and Swedish reports showed their patients to be substantially

older, at 69 and 68.5 respectively. The reasons and clinical implications for these differences are unknown and deserve further investigations in order to understand and serve different populations better.

A major deficit of the Asian joint registries is the lack of follow-up information, which is crucial for outcome analyses. Details of revision, for instance, the indication, are only collected when there is revision surgery (or death). A comprehensive annual report is required to identify as many linkages as possible between variables to answer clinical questions. Common clinical questions revolve around high quality outcome data rather than just the descriptive data given currently.

For example, incidence or time to event of an outcome, usually revision for joint arthroplasty, can be depicted using a Kaplan–Meier survival curve (30). Another example of outcome information is prosthesis time incidence rates (PTIR), which is used to describe the incidence (the rate of new events) of specific modes of failure in joint arthroplasty. The PTIR expresses the number of revisions divided by the total of the individual prosthesis-years at risk (28). Nevertheless, outcome analyses were not found in any annual reports of Asian joint registries.

Details of procedure categorisation are also lacking in the Asian registries. In addition to total hip and knee arthroplasty, primary hip and knee arthroplasty include partial arthroplasty e.g. unicondylar knee arthroplasty, patellofemoral knee arthroplasty and hip hemiarthroplasty. Despite the mention of these in data-entry forms, only Japan reported pertinent information of these procedures. The insufficient details undermine the completeness of data, which hinders analysis of data to solve clinical problems. Pertinent to this, the NJR Annual Report 2023 (28) showed that patients who received unicondylar or patellofemoral knee arthroplasty were typically younger than those receiving a TKA, which indicates a unique target group of partial knee arthroplasty. The NJR Annual Report 2023 showed data on the type of primary total hip arthroplasty by fixation methods, each further subcategorising by bearing surfaces e.g. cemented metal-on-metal, and therefore, information on whether these fixation methods demonstrated a longer or shorter time before revision is required can be obtained. Such information is not given in the Asian registries.

India and Japan only reported fixation methods without further details, whereas Pakistan illustrated anatomic fixation site and bearing surfaces separately. In general, Asian joint registries are at the stage where simple descriptive data are given, which is not in sufficient detail for research use. Thus, incorporation of data analysis, data details and data stratification are the key milestones for future annual reports of Asian joint registries.

There are several limitations to this narrative review. The representativeness of the data cannot be ascertained since there is no reference number for total cases of each country. Vaidya *et al.* (26) commented that lack of

participation of surgeons remained a huge challenge to completeness of registry data in India. This can bias the data and make it difficult to draw accurate conclusions for a specific population. The 2022 American Joint Replacement Registry executive summary highlighted developing initiatives to better care, which is critical to mitigating negative surgeon perceptions such as apathy, lack of trust and fear of disclosing information. (31) Education, active response to concerns and development of an efficient data transmission system with low technical capabilities are some important remedies of non-participation of surgeons. Moreover, there is little knowledge of healthcare systems and policies along with their effects on registry data. Another limitation is the heterogeneity of data presented in each registry e.g. mean BMI and median BMI, India reported men and women mean age whereas others only reported mean age, making comparison difficult. Meanwhile, there is insufficient raw data i.e. most data were presented in percentages instead of exact figures. Finally, language barriers add to the difficulties in the review of content. Some papers were published in non-English languages e.g. Chinese, Japanese, Arabic and Persian and impeded our understanding of the registry and might create misinterpretation of status of the joint registry.

## Conclusion

In conclusion, the number of primary hip and knee arthroplasty surgeries is expected to increase continuously in the coming years in Asia. The demand for knowledge regarding arthroplasty outcomes for Asians will follow this growing trend. It is therefore time for major Asian countries to build a comprehensive nationwide database of joint arthroplasty in order to monitor the outcomes and provide good quality data for evidence-based practice. Data analysis, data detail and data stratification are some suggestions given here for producing outcome variables instead of just the descriptive data given, for future annual reports of Asian joint registries. Despite the wide knowledge gap which needs to be filled, the multi-pronged effort and consistent improvement of Asian joint registries made thus far should be lauded.

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### Supplementary materials

This is linked to the online version of the paper at <https://doi.org/10.1530/EOR-2024-0085>.

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### ICMJE Statement of Interest

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

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**Author contribution statement**

LCML and SWC conceived the research. JPYC and SWC supervised the study. BCP and SWC conducted the initial search and drafted the manuscript. All authors contributed to the writing of the manuscript and approved the final version.

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