Response to: 'Correspondence on 'Incidence trend of five common musculoskeletal disorders from 1990 to 2017 at the global, regional and national level: results from the Global Burden of Disease study 2017' by Chiang *et al*

We appreciate Chiang *et al*[1] for their interest and comments on our research article entitled 'Incidence trend of five common musculoskeletal disorders from 1990 to 2017 at the global, regional and national level: results from the global burden of disease study 2017'.[2]

For exact occupations, it is unfortunately impossible to divide patients with musculoskeletal (MSK) disorders into groups according to their occupations since there are no corresponding estimates from the Global Burden of Disease study 2017.[3 4] We agree with your comments on effects of social risk factors and occupational risks between high and low human development index (HDI) countries[1]; in our study, a stable or increasing trend of age-standardised incidence rate (ASR) for low back pain (LBP) was observed.[2] However, occupational risks attributable to ASR might be more likely to be modified among countries and territories with higher HDI. Thus, as we mentioned in the discussion, the change difference of risk factors might determine the trend of incidence, and it presents a possible explanation for the negative association between estimated annual percentage change (EAPC) and HDI for LBP.[2]

In terms of population and age, we calculated EAPC to quantify the temporal trend based on ASR, making comparability across the age structure. Such standardisation could minimise the effect of age structure changes on EAPC, while increases in population may increase the total MSK incident cases. However, whether the incidence trends and patterns of MSK disorders were associated with different age should be estimated by age groups in the further studies. As for the variations of EAPC, the detailed EAPC for each countries and territories has been presented in supplementary table S6.[2] Indeed, the causes for variations of EAPC between countries within the same HDI are complex and well worth specific analyses. As we mentioned in discussion, there are the variations of change in major risk factors and different health system performance even between countries and territories within the same HDI, which has been listed as a limitation of the study.[2] For other causes, the effect of age was eliminated by standardisation. The effect of sex was found to be very limited, and there is no available data on occupations.

We obtained HDI data in 1990 and 2017 of countries and territories from the Human Development Report 2019 (http://hdr.undp.org/en/indicators/137506), where Taiwan's HDI was not listed. You indicated that Taiwan's HDI in 2019 was 0.911.[1] We are not sure of its comparability with the other data from the Human Development Report. Moreover, we need data in 1990 and 2017. The information you provided may be useful for the further studies. We agree that low popularisation of medical care in Africa and South America drive the trend of incidence for MSK disorders. However, its impact on detection rate should be cautiously determined, since the accuracy of the estimates for MSK disorders largely depends on the quality and quantity of input data to the models.[3 4] As for the blue icon in figure 4A, we think it would be better for MSK. LBP was the leading cause of total incident cases, but it cannot represent overall MSK disorders, as we still observed differences in EAPC between MSK and LBP at the global level and in some regions, especially East Asia. Thus, we present EAPCs for overall and the absolute maximum caused by specific cause. In addition, overall and cause-specific EAPCs at global and regional levels are shown in supplementary figure S17.[2]

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