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The Economics of Injuries

A Review of the Worker Environment in Qatar and India

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Abstract

FIFA World Cup 2022 is being played in Qatar, which puts tremendous pressure on infrastructure development. To cope, Qatar has brought in more than a million foreign workers, mostly from India, Pakistan, and Bangladesh. Serious concern for their well being has been expressed and Qatar has been accused of having slave-like working conditions.

This paper investigates this situation by using the disability-adjusted life year (DALY) metrics on the construction sector and relates that to the wage the workers receive. This estimate is then compared with estimates from India to provide assessment of the relative well being and economic incentives between the two countries.

This paper finds a valid economic reason for the migrant inflows to Qatar that is consistent with the reality that is observed.

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Acronyms

FIFA	Fédération Internationale de Football Association
GBD	Global Burden of Disease
HRW	Human Rights Watch
IHME	Institute for Health Metrics and Evaluation
ILO	International Labor Organization
ITUC	International Trade Union Confederation
MDPS	Ministry of Development Planning and Statistics (in Qatar)
NCRB	National Crime Records Bureau (in India)
NSSO	National Sample Survey Office (in India)
UN	United Nations
WHO	World Health Organization

Introduction

Qatar is a country of around 2 million people in the Persian Gulf bordering Saudi Arabia in the south. Qatar, as with its neighbors, is an oil rich country with a high GDP per capita.

Extensive controversy has been directed at this small country as for a FIFA decision to hold the FIFA World Cup 2022 in Qatar. The controversies surround the concern that Qatar does not have the infrastructure to host a world event such as the World Cup. Though, infrastructure investments into Qatar have been estimated to be more than US$140 billion (ITUC, 2014).

To implement these investment ambitions additional labor has been brought in. Out of the 2 million people in Qatar, 85 – 90 percent are foreign nationals (De Bel-Air, 2014; DLA Piper, 2014; HRW, 2014; UN, 2014) brought in as workers and service personnel. Much concern for the well being of these foreign nationals has been presented where questionable working conditions, low salaries, and loss of freedom have been quoted and that foreign nationals are suffering. Human rights groups such as Amnesty (2013), Human Rights Watch (2012) and International Trade Union Confederation (2014) have all investigated the situation and issued detailed reports, while newspapers such as the Guardian report on the issue. The United Nations (2014) sent a Special Rapporteur to Qatar in 2013 to evaluate the claims about the well being of foreign workers.

The atrocities unanimously presented by these reports build a strong case against Qatar in their treatment of foreign nationals, so much that the Qatari government in 2014 employed the DLA Piper law firm to answer these claims. These claims are the basis of this paper's ambitions to economically investigate the working conditions in Qatar and evaluate the situation by comparing the results with similar observations in India.

Study period

The period studied in this paper is 2013, as this year possesses a greater extent of information surrounding the labor issues in Qatar than adjacent years. A consequence

of this is that some information will not be fully up-to-date and later developments are neglected so that a more consistent result is presented. Some developments have been reported to improve the situation much due to the reports referenced in this paper, especially the DLA Piper report. However, the outcomes of these changes have yet to fully materialize and thus this work will regard these as promising improvements but not considerable for its aims.

Finding the characteristics of the foreign labor market in 2013 in Qatar bears some difficulty as Qatar does not officially release population data organized in nationality but instead separates "Qatari" and "Non-Qatari" (MDPS, 2013). With this, there is some uncertainty what constitutes a foreign national and thus to gather accurate intelligence to estimate the total number of foreign nationals. As such, the number of foreign nationals in Qatar in 2013 was between 1 380 000 and 1 800 000 (Amnesty, 2013; DLA Piper, 2014; HRW, 2014; ITUC, 2013; MDPS, 2013; UN, 2014).

The main concerns for the foreign nationals are regarding unfair recruitment, below-average living arrangements, non-commitment to contracts, postponed salary payments, injury-prone working environment, and inaccessibility to justice for the migrant workers both before and during their time in Qatar. Ample display of these issues can be found in aforementioned reports so this paper will refrain from a detailed description of the situation, instead will key issues about the labor market in Qatar be highlighted and relayed to the labor market in India to reflect the relative hardship of the workers.

Construction sector

The construction sector of Qatar is a highly exposed employment sector for mistreatment, so much focus is put on the construction sector but little is objectively know about the sector as a whole.

Even with much coverage, little is mentioned about the size of the construction sector, however official Qatari figures state that 568 676 individuals (MDPS, 2013) worked in the sector in 2013. Note that this statistic excludes children 0-14 years of age.

However, child labor claims against Qatar are scarce so it is assumed that the inclusion of children will alter the number of construction workers by an insignificant amount. Additionally, the number used in this paper will exclude females and Qatari citizens as well, leaving individuals that are male, above 15 years of age, Non-Qatari, and all working in the construction sector. One additional consideration is that persons above 60 years of age will not include but instead it is assume that construction workers retire at age 60 and will be able to go home to their country of origin. The total amount of construction workers will thus be 556 671 individuals.

If similar restrictions are used to estimate the total number of Indian construction workers, working and living in India, the number in mid-2012 comes to around 35 000 000 (NSSO, 2014a). Child labor numbers has been omitted for reasons of simplicity and to increase the compatibility with statistics from Qatar.

The salary for construction workers in Qatar is not officially published, however in the official figures, an average of all male construction workers is stated to be 4 693 Qatari Riyals (approx. US$1290) per month (MDPS, 2013)[1]. Serious doubt has been cast about the validity of this number with case studies conducted by ITUC (2014), HRW (2012), and Amnesty (2013) showing a different reality. One explanation for differences in the cases studies compared to official figures is that there could be disparities between contracted salaries and actual salaries as many individuals testify. This paper will consider these cases while using official figures as additional information more consistent with contracted salary agreements.

Salaries can also differ greatly between foreign workers in Qatar. Even salaries within the construction sector differ depending on the length of the contract, what position the worker has but also which country the worker comes from. Interviews conducted by ITUC (2014), HRW (2012), and Amnesty (2013) put salaries for construction workers to be between US$160 to US$300 per month. However, these reports are single case studies and these salary levels might not include all Non-Qatari within the construction sector. A hierarchy system might also be the reason for the difference in

[1] Worth noting is that the few tables not separating Qatari and Non-Qatari are the ones related to wage.

salary statistics as BQ magazine reported that managers in the construction sector earned an average of US$6 000 (Soman, 2014) per month.

The average salary for male Indian construction workers, across education levels, is 358.37 Indian Rupee (approx. US$ 5.37) per day (NSSO, 2014a). Nothing is stated of the possibility of child labor inclusion, however as most have low education level this could be a possibility. As construction workers in Qatar also have low education levels, it will be assumed that these statistics are comparable.

Terminology

Migrant worker to Qatar

In 2013 about 1.6 million out of Qatar's 1.8 million inhabitants (above 15 years of age) were classified as "Non-Qatari" (MDPS, 2013). Different names are used for the Non-Qatari, such as foreign nationals, foreign workers, migrant workers, and expatriates, among others. In this study only two distinctions are made, the total number of Non-Qatari, presented interchangeably by the previously mentioned names, and construction workers, named as such or as workers.

Migrant workers come from many different countries, however more than two thirds come from India, Nepal, Philippines, and Bangladesh (DLA Piper, 2014; De Bel-Air, 2014). Some work with domestic tasks, such as maids and cleaners, but the largest sector for migrant workers is the construction sector (MDPS, 2013). Though they are a majority of Qatar's population, they are not Qatari citizens and this could have significant effects on their lawful rights and their access to justice.

Migrant workers have been present, and been a majority (De Bel-Air, 2014), in Qatar since its independence in 1971. The growth of migrant worker inflow to Qatar has been exponential and is expected to continue to grow, with one estimate saying an additional one million migrant workers will enter, up until FIFA World Cup 2022 (Amnesty, 2013).

Construction worker

What constitutes a construction worker is not clear within the reviewed reports and this results highly likely differences between countries. India has a deeply detailed categorization called NIC-2008 where constructions workers are classified with numbers between 41 and 43 however similar system does not exist in Qatar and thus construction worker will have to de defined from slightly different perspectives.

India, on the other hand, has a highly unstructured work force with around 75 percent of the construction sector being classified as informal (NSSO, 2014b). What this means is that large parts of the construction sector works without a union, has little to no insurance, and works without proper health and safety regulations. Many also work without formal work contracts (NSSO, 2014b) and therefore it is difficult gather reliable national labor statistics.

Methodology

The aim of this paper is to investigate the occupational hazards in the construction sector in Qatar and provide economic aspects that might affect worker choices. This is then compared with similar observations in the construction sector in India. Given the high number of Indians as foreign workers in Qatar, this comparison provides signs to the relative well being of the construction workers in Qatar while providing a probable cause for the labor migration. This paper will look at the injuries endured by the workers in the construction sector while comparing it to the salaries given and then draw conclusions about the workers and their economic incentives for working in Qatar. Thus, the base for its conclusions is on the perceived value of the employees by looking at the wage given by the employers and the injuries sustain while working. Injuries prevalent in the construction sector are collected from official figures, hospital admission studies, and third party estimates. Injuries and deaths are selected and categorized to be relevant to what a construction worker can be expected to experience.

First step in achieving the aim of this study is to present the situation in the construction sector in Qatar. Information about the issue is obtained through various

sources and reports from government affiliates, assorted interest groups and international organizations. Objectivity regarding these reports could be questioned, however the spread of the data gathered negates many of these concerns. Data of importance are wage, health and safety, number of workers, reported injury statistics, and worker characteristics. The Indian construction sector will here be views a control, where it is assumed that if migrant workers had not worked in Qatar they would have worked in similar conditions to the one currently existing in India. As such, the construction sector in India will also be investigated.

The second step is to develop a specific disability-adjusted life year (DALY), which explains the amount of time a person is plagued with disease, representing the construction workers in Qatar. A similar process is used to compute DALY for India so that the two working environments can be compared. DALY calculations will follow the methodology within WHO to calculate DALY (Mathers, Stevens, 2013; Mathers et al., 2001; Prüss-Üstün et al., 2003). The two DALY estimates are used to evaluate the construction sector in Qatar and provide a comparable metric for the construction sector in Qatar that can be used in further research in health economics.

Multiple conclusions can be made with these DALY estimates, such as the dangers of being a construction worker in the two areas and how that compares to other employment areas. However, this paper will focus on an economic valuation of the DALYs within the construction sectors. This proves an additional viewpoint to worker well being and gives a workable perspective on economic incentives and probable explanations to migration flows.

In the past has GDP per capita been used to estimate the value of a DALY (for ex. Sachs, 2001) as DALYs are said to cause production disturbances for a society in that they removes people from the labor force and diverges resources to treating disease-ridden people (Bloom et al., 2014). As such, it is explained that the existence of DALY has a direct effect on the economy and that DALY is of harm to the society. These studies conclude that if an intervention aimed at preventing DALYs costs less than three times the GDP per capita it is a cost effective intervention (Marseille et al., 2015).

This, though, will serve as a limitation to the value estimates in this paper as the GDP per capita differ greatly between construction workers and the Qatari average. Additionally, it is not the aim to present an economic burden on a society, as GDP per capita would do, but instead explore economic risks within a sector of society. This paper will utilize DALY to investigate the hazards for construction workers but study economic incentives. GDP per capita will be replaced with wage to exemplify a person's earned value in the society and not the burden on a society. The economics of DALYs will therefore be aimed to a different assessment of risk, where a person's choices are examined. The wage can, instead of being the society's cost of lost production, be viewed as the employers' evaluation of the risks endured by the workers and if the workers have free choice in work place this will be seen as the value of the risks[2].

After estimates on DALY are complete, they will be combined with income to generate an economic value that is specific for the construction sector of Qatar. The same is developed for India. Wage is assumed to be earned only within the country and only when the individual is healthy. Any other monetary incomes will be omitted as they may distort economic valuation. However, one considerable cost need to be discussed to accurately capture the reality for construction workers in Qatar, the recruitment cost of coming to Qatar (ITUC, 2014).

Given this economic viewpoint of the situation in Qatar provides additional indication of the existing problems for foreign workers and provides a suggestion for the choices workers have when working in Qatar.

Limitations

This paper will not provide any primary data points but will instead review current reports and articles on the matter and use these to generate sensible estimates. Thus, it is not in the scope of this study to discuss the ethics of the situation for the foreign

[2] However, freedom of choice might not exist in Qatar as reports have shown that the workers might be in Qatar under false pretenses, and get tricked into lower salaries and additional costs; see for example Amnesty (2013) and HRW (2012).

workers in Qatar or add any thoughts on the validity of the various reports. Instead, the paper will assume the reports have enough merit to constitute an economic analysis and leave other consideration for another time As primary data is scarce and that data might have different characteristics, reasonable proposals for the missing data is given.

This paper will not consider all foreign nationals in Qatar but instead focus on the construction sector, as it is the largest sector for migrant workers and because of the pronounced concern for their well being. Hence, the results from this paper may not be similar for all foreign workers and thus reserves itself for the possibility for unlike conclusions if looked from another perspective. The aim is instead to build on present concerns for the vulnerable individuals within the construction sector in Qatar and quantify any health concerns.

Theoretical Framework

The first Global Burden of Disease study was released in 1996 (Murray, Lopez, 1996) and provided a comprehensive view of mortality from around the world for the year 1990, it is therefore called GBD study 1990. With this study, a new metric was devised in collaboration between WHO, the World Bank, and the Harvard School of Public Health called DALY (disability-adjusted life years) to project the total disease burden on a region and the world (Mathers et al., 2001).

DALY is a measure of the loss of life due to disability from a wide variety of diseases and injuries. Mathers and Stevens (2013) have written a full explanation of DALY with its strengths and limitations but simply put can DALY be thought of being a health gap between the ideal, disease-free life and the observed life. DALY combines two measurements, the years lost due to premature death (YLL) and the years lost due to disability (YLD). The first expression is binary and can only take the form of either 1 (death) or 0 (alive). This expression depends on projected life expectancy at the time of death while the other expression depends on the severity of disability ranging from zero to one. YLD can take any value between 1 and 0, for example is untreated

deafness estimated to have a disability severity of 0.233 for a toddler while untreated blindness is 0.600 (IHME, 2012).

DALY statistics are readily available from WHO and their Global Burden of Disease metrics. 2013 statistics show that 339 300 DALYs[3], or 165.4 per 1000 inhabitants, were present in Qatar (IHME, 2014). In India the whole population suffered 494 699 000 DALYs, or 386.6 per 1000 inhabitants.

When calculating DALY two considerations are reoccurring, discount rate and age weighting. The structure of DALY calculation has change in recent years, where WHO employed discount rate and age weighting before GBD 2010. Discount rate explains how a healthy year is more worth now than in the future. Often a 3 percent discount was used, which resulted in a healthy year being valued 24% less 10 years from now compared to now (Prüss-Üstün et al., 2003). Age weighting refers to which age a person is most valued, for example that an injury at the age of 25 is worse than the same injury at age 70 but also, and more controversial, the same injury at the age of 10 (Murray, Lopez, 1996). For GBD 2013 study, both discount rate and age weighting have been omitted.

DALY was developed with a similar concept to an earlier health metrics called QALY (quality-adjusted life years), though DALY evaluates the presence of disease, QALY estimates what the remaining quality a life is after disease has been included. It can therefore be thought of as the opposite of DALY. Both metrics measure quality on a scale from zero to one but QALY measures desirable years while DALY years are to be limited. This means that 0, as in quality years, is bad while 0, as in the presence of disease, is good. A consequence is that QALY can be thought of as 1 – DALY (Sassi, 2006). As it is dependent on the disease severity, it can be used to visualize how many quality years a disease removes. Both metrics were developed for calculations of health effects but QALY calculations are more often used to evaluate health interventions' cost-effectiveness and aims to aid decision makers to if a disease intervention is a valuable investment (Weinstein et al, 2009). DALY also aids policy

[3] Note: the total population of Qatar is considered to be 2 051 000, meaning that foreign nationals and construction workers are included in the statistics.

makers but this metric is more suitable for aggregated estimates and macro-evaluations and thus is used more frequently in large-scale models.

QALY is not used in this paper, as QALY estimates require the knowledge of all potential hazards in a life to generate a quality life for a construction worker. Assumptions concerning diseases that with certainty are not connected to the construction sector will still have to be made and as data concerning even death statistics is scarce, this will put additional pressure on the robustness of this study. If only injuries and diseases connected to the construction sector are used while calculating QALY, it assumes that a person is completely healthy outside of the construction sector and suffers only diseases and injuries while working. However, one link between the methods used in this study and QALY can be seen. If two DALY estimates are compared with the same premise between Qatar and India, the difference can be thought of being the difference in the quality of life. However, such estimate for these two countries is of uncertain accuracy as for the many unknown variables and for the lack of proper insight in the sectors.

Value of statistical life (VSL) is one additional metric that can be used to evaluate the economic value of a life. This model provides a value based on wage given to the person in question and the risk that same person endures (Viscusi, Aldy, 2003). The theory of willingness-to-pay is used extensively, example how much a person is willing to pay for a one percent reduction in risk. From this can a value of statistical life be derived where most studies range from $3.8 million to $9 million (Viscusi, Aldy, 2003). VSL is widely used to evaluate health risks by many organizations, such as the United States Environmental Protection Agency, which provide their own VSL estimates.

As VSL is closely connected with risk, it is necessary to gather detailed personal information for a significant and narrow VSL estimate. There exists no such data for Qatar and even by conducting a survey; it would be hard to get a sample representing construction workers, with the additional difficulty of actually reflecting risk averse behaviors.

One additional hardship for VSL in connection with construction sector of Qatar is the need to evaluate individual willingness-to-pay and risk assessments. To conduct such a survey would meet with political resistance and potential risk of arrest, thus the lack of such survey. Without this, there would be no assessment as the trade-off between additional salary and an increased risk. DALY calculation therefore benefit from the scarcity of the available data. As DALY provides the least amount of uncertainty, it is chosen for further use.

Valuation of DALY in economic terms is a highly discussed topic that complicates the issue of using DALY for decision-making. Even since its creation, DALY estimates have been analyzed through GDP per capita to see how DALYs affect production (for ex. Brown, 2008; Dalal, Svanström, 2015; John, Ross, 2010). DALY's presence in a society has two main consequences on economic production. First, diversion of production gains to treat people affected by DALYs in the form of payments of hospital costs, and second, the decrease of available labor in the society due to DALYs (Bloom et al., 2014).

It is argued that GDP per capita considers both these aspects of the labor market and represents the society's economic loss. WHO has devised economic threshold for DALY prevention initiatives where if costs are less than three times the GDP per capita the initiatives are considered cost-effective (Marseille et al., 2015; Sachs, 2001). Yet, this approach has been argued to be inconsistent and not give results that can be used for policy-making (Dolan, Edlin, 2002), so some DALY estimates refrain from adding an economic valuation to the results.

Other economic values can be used in connection with DALY, for example total investments in the concerned sector and hospital costs associated with a DALY-producing disease. An individual's wealth can also be used with DALY (World Bank, 1999) and the interpretation is of interest to this paper. This approach is based on socio-economic aspects that draw of the reasoning of potential earnings and thus provides a view into the economic indifferences in the face of risk. However, this method has been criticized as often a willingness-to-pay perfective is used, which often involve forcing healthy people to evaluate situations where they are not healthy.

This is argued to skew the result so that no creditable conclusions can be made (Dolan, Edlin, 2002). This paper addresses this by removing the individual's ability to have an opinion on the matter of economic compensation.

If working is unfeasible, it is loss of wage and accumulatively the loss of wealth for an individual. DALY represents periods where working is impractical and sometimes impossible. The interpretation of this being a situation similar to VSL where wage is the value of enduring a potential risk, yet the risk (DALY) has already occurred and therefore removes any willingness-to-pay possibilities. Also, DALY is not a value of life but instead the potential additional time if risk did not exist. Thus, DALY and wage does not estimate the economic value of life but instead the economic loss from living with risk. The problem with wage and DALY is that as workers have been reported to arrive in Qatar without full knowledge of their working conditions, given a salary that is a perceived value of the worth of working in Qatar by the employers. It can therefore be expected that the wage does not fully represent the present risks and give a slightly skewed picture of reality.

If DALYs were to increase, fewer workers would arrive depending of their risk assessment and price elasticity so the wage would have to increase as well to ensure a continuous flow of migrant workers. The fact that migrant worker inflow continues to increase suggests that the number of DALYs is stable or lower than their risk assessments, or that the DALY experienced is considered acceptable by the wage given. Amnesty (2013), HRW (2012), and ITUC (2014) would disagree with this statement as they report on breaks of contracts, a more hazardous environment than shown, and additional monetary requirements not previously know to the workers. The frequency of these occurrences is hard to determine but that they exist at all imply a misalignment of wage and DALY that is detrimental for the workers. The prevalence of such occasions has an effect of this study's estimates and will have to be reflected upon.

Results

In developing a DALY for the construction sector, we first consider the years of lost life (YLL). It is binary in that disability severity can only be either 1 or 0, dead or

alive. In DALY calculations, deaths are considered 1's and generate full disability for the remainder of a person's life. YLL are calculated using the following formula:

$$YLL = D \times W \times LE^{4}$$

where D is the total number of deaths, W is the disability weight (W=1), and LE is the residual life expectancy at the time of death.

The use of life expectancy calls some a deeper study as it is presented in a country-based approach in the GBD study (IHME 2014), so which country should be the foundation for the estimates in this paper? Qatar is the country where the DALYs occur so it would be appropriate to consider Qatar's life expectancy, also keep in mind that the total DALY calculated by GBD 2013 deems Qatar's population to be 2 million, thus including foreign nationals. This could be detrimental though as this study assumes that workers come to Qatar at the age of 15. Thus, they are not exposed to the conditions present in Qatar at an earlier age. As life expectancy is lower in India, we should see greater decrease in life expectancy with the inflow of migrant workers, especially for a small population as in Qatar. This we do not see though but instead an almost linear change. However, life expectancy is almost linear in India as well, which increases the possibility that the life expectancy of foreign nationals have been considered. As Qatari nationals are not separated in the statistics, it is assumed that the lower life expectancy from home countries has affected the life expectancy statistics from Qatar.

YLL calculations in this paper use the number of 556 671 construction workers in Qatar with a categorization into age groups taken from MDPS (2013) with additional calculations to separate out Non-Qatari. Indian construction workers have been estimated to be 35 000 000 using statistics from NSSO (2014a).

[4] Note that this formula is different from previous WHO calculations (see Prüss-Üstün et al., 2003). The reason is that in GBD 2013, no age-weight is considered and DALY is calculated with a 0% discount rate (Mathers C., Stevens, G., 2013). To be compatible with total estimates this paper follows the same procedure.

To calculate YLL for the construction sector of Qatar only number of deaths needs to be determined. As mentioned before, this is a highly discussed and controversial subject. This paper cannot give any validity to any of these claims but aims instead to range possible scenarios.

First, as very limited information exists concerning the identity of the reported fatalities, it has the consequence of restricting the accuracy of a YLL estimate as the estimate depends on the time a person has left to live, in for of residual life expectancy. So, if all the deaths happened to older workers the number of YLLs would be less while if younger people suffer, a larger YLL can be reported. As information is not known, this paper will assume that the fatalities happen equally likely for all age groups, especially given that many of the injuries of interest are accidental. As GBD estimates, and this study's estimates, refrain from using age-weights and age-discounts (Mathers, Stevens, 2013) and that life expectancy is close to linear, the YLLs will largely be dependent on the size of the age group in the construction sector.

Foreign worker death is the single most argumentative case for Qatar not to have FIFA World Cup 2022. For comparison, ITUC (2014) reported that for FIFA World Cup in Brazil 7 workers were killed and for the World Cup in South Africa 2 people lost their lives. ITUC claims that up until early 2014 1 200 workers have died during the preparation for the World Cup in Qatar. With this rate around 4 000 workers will have died in Qatar before the World Cup starts.

The 1 200 workers dead have been a highly disputed number from various sources saying that there is nothing that proves these deaths are related to the construction of the World Cup. Moreover, that these deaths are just expected fatalities from natural causes as one representative from the Indian Embassy states that the death statistics in the media are used in an "inappropriate manner" (DLA Piper, 2014, p. 87). The Qatari government went further and answered to ITUC's claim by stating, "not a single worker's life has been lost" (Qatar News Agency, 2015) due to work related accidents.

DLA Piper (2014) concluded that 964 workers from India, Nepal and Bangladesh had died in 2012 and 2013 however; DLA Piper could only confirm 9 work related fatalities from these three countries in 2013. The difference is explained by the lack of proof of a death being work related. Many more deaths are stated in the DLA report to be cardiac arrests, something DLA Piper does not consider work related but might be so as construction workers spend large amounts of their days outside in very warm conditions. Al Thani et al. (2015) found that 28 foreign workers lost their lives in 2013 due to work-related accidents. Though, it is not clear from this paper how many of these deaths were workers in the construction sector, nor is it clear if all foreign worker deaths are included as their data is gathered from Hamad Trauma Center, a hospital where all major injury cases in Qatar are handled. Thus, the data set is presented as being able to be considered a national registry for selected injury types.

If assumed that the life expectancy of Qatar incorporates life expectancies from the foreign workers currently in Qatar and that the deaths occur proportionally to the size of the age group within the construction sector then YLL can be calculated. First, if the Qatari government is correct that not a single individual has died from work-related injuries since the start of FIFA World Cup constructions then of course the YLL is zero. If instead the claim from ITUC of 1 200 dead foreign construction workers since the start of construction then that results in a total YLL in 2013 of 20 165, see Table 1 in the Annex. However, as the number of migrant worker inflow is exponential (De Bel-Air, 2014) it is reasonable to expect a higher number of deaths in 2013 compared to 2011. 20 165 YLL in 2013 is therefore a conservative estimate from the ITUC statistics.

With similar methods, the 9 dead from the DLA Piper report (2014) would create 454 YLL, yet that is probably an understatement as more that people from Nepal, India, and Bangladesh work as construction workers. From Al Thani et al. (2015) this same procedure creates 1 412 YLL, but it suffers from lack of occupational status at the time of the fatalities. Noteworthy is that DLA Piper and Al Thani et al. gathers their statistics from the same source, the Hamad Trauma Center, and thus it probable that their results would be similar.

The gap between the ITUC statistics and the Al Thani et al. is rather large and extensive disagreement concerns this gap. The main disagreement relates to what to include as work-related fatalities. The probable explanation is diseases that are either occupational or not. Amnesty (2013) notes that in 2012 3 Nepalese workers died from falls while the same year 102 died from cardiac arrest. According to DLA Piper (2014), the number of sudden deaths closely resembles Amnesty's cardiac arrest statistics and notes that many sudden deaths are described as cardiac arrests. The embassies comment by saying that these statistics are normal and that most deaths are naturally caused (DLA Piper, 2014). Human Rights Watch points to the high cardiac arrest risk by noting that the workers are not in the typical age of having many cardiac arrests (HRW, 2012).

Many of the reported deaths by DLA Piper were of unknown causes; the conclusion is that these could just be a result of natural causes. In fact, the Indian Embassy in Qatar considers 200-300 deaths per year to be "quite normal" (DLA Piper, 2014, p. 87) and thus autopsies are not always conducted. ITUC (2014), HRW (2012), and Amnesty (2013) all indicate that these additional deaths could be connected to occupational hazards. ITUC rationalize this by referencing the high outside temperatures in Qatar, the length of a working day, and the lack of rest days. The stress that many foreign workers bear from trying to provide for their families at home could add to injury statistics.

Amnesty and Human Rights Watch most probably assumes that cardiac arrest is work-related; in fact, if cardiac arrests are included in the YLL calculations the statistics gap nearly disappears. However, this assumption is highly hypothetical and rests on few facts connecting it to work-related injuries.

On the other hand, the disregard of the possibility that cardiac arrest can be work-induced by the two other studies has little to no evidence either. According to GBD study 2013, the total number of YLLs from cardiovascular disease in Qatar was 8619.3 for males between the age of 15 and 59 (IHME, 2014). Many of these occur outside the construction sector and others lack credible reason to be classified as work-related in the construction sector.

DLA Piper (2014) is aware of a potential flaw in the cardiac arrest statistics in that some death could be classified as cardiac arrests to discourage the deceased's family to seek compensation. Statistics given to DLA Piper show that 304 foreign workers died from "sudden 'cardiac' death" (DLA Piper, 2014, p. 90) in 2012. However, why not natural death could be declared is not clear. If the authorities are afraid of legal claims but the deaths are from legitimate reasons then there is no reason to hide the true cause of death as a cardiac arrest.

The scarcity of credible research into the identities of the cardiac arrest victims halts progress. With the available statistics, this paper has difficulty determining health diseases that plague the construction workers and even harder to determine which, if any, are a direct cause of work-related conditions. Moreover, the available statistics might not be trustworthy by the lack of third-party oversight.

The absence of detailed death statistics leaves any further considerations to be highly uncertain speculations, however a confidence interval can be produced.

304 migrant workers dead from cardiac arrest (DLA Piper, 2014) would generate 15 326 YLLs (assuming that deaths occur equally likely in all age groups and only affect construction workers), which is about double what the GBD study showed that all working-age men in Qatar suffer. If instead adjusting for the size of the construction sector in comparison to all working-age men in Qatar the total YLLs for construction workers is 6 604, however that would be similar as to say that cardiac arrests are equally common within the construction sector as outside it, which would contradict claims that the construction sector is a hazardous working environment. To make the claim that cardiac arrests are more prevalent in the construction sector would require deaths to be between 131 and 171 per year, generating YLLs between the situation where the construction sector is no more prevalent towards heart disease and the scenario where all heart disease for the age group occurs in the construction sector. This is well within the referenced material but the question remains; how many of these deaths are work-related?

Two studies of cardiac arrests in Qatar showed that Qatari nationals had a higher frequency of cardiac arrests than both Indians and Nepalese (Irfan et al., 2015) and that Middle Eastern Arabs suffered almost double the amount of cardiac arrest compared to South Asians (Patel et al., 2014). Even though male Qatari national aged 15 to 59 is a fraction of the size of foreign nationals, the relatively high prevalence of cardiac conditions decreases the relative risk for foreign nationals to be affected.

Traffic accidents constitute a significant part of the death statistics in DLA Piper (2014) and stand for 42.1 percent of all trauma injuries in men (Bener et al., 2012). However, Qatar has a high mortality rate on the road with 35 males per 100 000 in the age group 15 to 59 (IHME, 2014). 72 migrant fatalities in road accidents (DLA Piper, 2014) are not unreasonable when Qatar consists of a large majority of foreign nationals. If occupational reasons were to blame then the traffic accidents would appear in the Hamad Trauma Center statistics, in fact Al Thani et al. (2014) include 310 motor vehicle accidents. Thus, if any traffic deaths were from occupational hazards they are included in this paper's DALY estimate.

Developing a YLL for the Indian construction sector is not without difficulty either. India has in the past been accused of downplaying the extent of occupational injuries, where ILO estimated that 40 000 workers dies in a year when India only reported 222 fatalities (ILO, 2005).

Newer statistics are hard to gather because of the informal characteristics of the work force in India. The construction sector is in large parts informal many workers work without worker protection and many without written contract. As such, injury statistics are almost non-existent.

Estimates of 48 176 fatalities in 1998 (Hämäläinen et al., 2006), with a fatality rate of 11.5 per 100 000 workers, 47 000 in 2003 (ILO, 2008) and 45 000 in 2009 (Biswas et al., 2014) suggests that the statistics remain relatively stable, if anything, slightly downwards. However, other estimates diverge from this with Leigh et al. (1999) estimating yearly fatal occupational injuries to be the same with the addition that occupational diseases account for more than double that amount. This serves a rather

large problem when comparing Qatar and India because Qatar presents no statistics on occupational disease, which might be able to explain the differences between claim fatalities by ITUC (2014) and confirmed fatalities by DLA Piper (2014). As only speculation can be drawn, occupational disease will have to be disregarded for now with full knowledge that this skews the estimates. To continue, the Indian government releases each year a statistics on accidental deaths, which in 2013 totaled 247 511 deaths for male between the age of 15 and 59 (NCRB, 2013), however it makes no mention if any are occupational fatalities.

With these estimates a calculated YLL by using a similar process as in Table 1 but with age groups from NSSO (2014a) and life expectancy from India (IHME, 2014). 40 000 occupational deaths is used as a lower limit and since the construction sector in India represents about 9 percent of the work force in India (NSSO, 2014a) will 3531 deaths, or 132 033 YLL be used as the lower limit for occupational deaths in India. The upper limit comes NCRB (2013) and by delegating a proportionate amount to the construction sector the resulting YLL is 816 949. Keep in mind though, that this YLL with high certainty is too large as it includes deaths that are accidental but not necessarily occupational.

The GBD study from 2013 (IMHE, 2014) state a YLL suffered by males between the age of 15 and 59 by four suspected occupational injuries (Falls, Foreign body, Exposure to mechanical forces, and Motor vehicle accidents) similar to Al Thani et al. (2015) to be 450 863, when adjusted for the size of the construction sector. However, as with the NCRB figures it is not known how many of these are occupational.

One noteworthy finding in the GBD study from India is that cardiovascular disease is by far the largest contributor to YLL by the reviewed diseases. This has the effect that Indian people have a relatively higher prevalence to cardiovascular disease than in Qatar. This is contradicting Irfan et al. (2015) and Patel et al. (2014) while it renders Human Rights Watch's claim that construction workers in Qatar are not the usual age for heart disease unsubstantiated.

Injuries sustained

As DLA Piper (2014) notes traffic accidents, self-harm, and falls and falling objects contribute to a large percentage of migrant worker deaths, additional causes are considered, for example cardiac arrests.

Occupational hazards for construction workers can be collected through hospital admissions (Al-Thani et al., 2014, 2015; Bener et al., 2012). These provide work-related hazards and what kind of injuries that occur in the construction sector. Noteworthy is that none of these studies include occupational diseases, something that has the potential of generating years lived with disease (YLD), instead of YLL, in larger amounts then the injuries presented.

With injury statistics, the second part of DALY, YLD, is being estimated. In recent years, a prevalence perspective is taken with calculations (Mathers, Stevens, 2013), which is different from the earlier used incidence perspective. Instead of measuring new cases of a disease and comparing that with the length of the disease, a measurement of new cases and existing cases are gathered. One of the advantages of this approach is that it more closely reflects the current health reductions being experienced. Prevalence YLD is calculated through the formula:

$$Prevalence\ YLD = \sum_{d=1}^{\infty} P_d \times W_d$$

where P is the number of new and existing cases of a certain disability, d, and W is the disability weight associated with that disability.

First of, falls and falling objects contribute largely to bodily damage in the construction sector in form of bone fractures, spinal core damage, and eye injuries, and thus is a valuable beginning in estimating YLD. Disability weights for these injuries are given in the GBD study from 2010 (IHME, 2012). Different weights associated with bone fractures range from 0.016 to 0.390 with additional weights as high as 0.673 for other injuries.

According to Al Thani et al. (2015), 2015 trauma induced occupational injuries occurred between 2010 and 2013, this is significantly lower than Bener et al. (2012)

reported meaning that Al Thani et al. (2015) are more selective in the choice of inclusion of injury. As such, Al Thani et al. (2015) serves as a lower limit to what a worker can experience in Qatar. They report that 508 out of the 2015 observed cases occurred in 2013 with 28 people dead from occupational injuries. The use of Hamad Trauma Center limit these studies from considering cardiac arrests, respiratory problems, and other injuries not categorized as trauma-induced.

The injuries in this study are of the category of being highly probable occurrences in the construction sector. The injuries in the Al Thani et al. (2015) are separated to reflect occupational identities with the one closest resembling construction workers to be "General labourer [sic]" (see Table 2), yet if injuries are proportionate to occupation, the general labourer represents a lower proportion confirmed by the embassies to be construction workers (DLA Piper, 2014). With this, this paper concludes that most injuries in this study could be occurring in the construction sector. Nepalese, Indians, and Bangladeshi, which have a high presence in the construction sector, suffer greatly by the injuries included in the study. Injuries in the study are of importance to the aims of this paper and to evaluate the health risks in the construction sector in Qatar. As such, the sample from Al Thani et al. (2015) will be thought of being a representable sample of the injuries in the construction sector. Because of the inclusion of women and elders in the study some alteration are made.

Fall from height and falling objects constituted around 70 percent of registered injuries for selected nationalities (Al Thani et al., 2014, 2015). Most probable outcomes of occupational fall injuries are head, face, spine, ankle and lower leg injuries (Bener et al., 2012) with high risk of multiple injuries.

460 occupational traumatic accidents are assumed to have happened in 2013 for non-Qatari males in the construction sector, (excluding accidents for Indonesians as all these accidents occurred during housekeeping activities), with mostly fractures as outcome and a full recovery from the injuries within a year of the incident. Distribution of injury site follows Bener et al. (2012, see Table 3) and injury site subsequently relates to type of injury. The proportionate amount of injury location exceeds 100 percent leading to a conclusion that one single injury caused during work

has a higher than one chance of affecting multiple areas of the body; this is consistent with results from Tuma et al. (2013).

Accompanying disability weights from GBD 2010 (IHME, 2012) will be used with the assumption that if an injury affects multiple locations (example, a broken leg and a broken wrist) disability weights will not exceed W<1 as this will cause and injury to become a death. With this approach, "multiple organ injuries" (Bener et al., 2012, see Table 3) can be disregarded. Since it is not stated in Al Thani et al. (2015) how many people are affected by the injuries, multiple injuries can still affect the same person but that is not reflected in the statistics. Injury location statistics now account for 96.7 percent of injuries meaning that some injury locations are unknown and injuries affecting multiple locations are counted more than one time.

The prevalence perspective makes possible for pre-existing cases to be omitted as recovery is assumed shorter than one year and thus cases existing in the beginning of the year can be nullified by the cases remaining by the end of the year. However, as the population of Qatar is increasing and injuries increasing as evident from Bener et al. (2012) certain consideration need to be made. Moreover, as there is possibility that a few of the cases have longer lasting duration than one year while bone fractures and similar injuries have significantly short recovery period it is reasonable to assume that the overall recovery rate does not exceed one year. As the population is increasing it is reasonable to assume that the injuries by the end of the year surpasses the injuries by the beginning of the year even though recovery rate is less than one year.

Disability weights is connected with the bodily harm sustained from injuries, however information about the resulting harm from the injuries is not given by either Bener et al. (2012) or Al Thani et al. (2014; 2015), however the injury statistics used in Al Thani et al. (2015) states that the occupational injuries had a mean ISS score of 12.2[5]. The injuries will therefore be viewed as severe enough to cause fractures or muscular lesions, however not severe enough to cause relatively long recovery time. Internal injuries are being considered equal in severity as poisoning. Short-term disability

[5] An ISS score of 15 or above is classified as a severe injury.

weights are chosen as to be consistent with fractural injury characteristics and that the reported need for rehabilitation is relatively low (Al Thani et al., 2014; Tuma et al., 2013). Unknown injury locations are calculated with an average of all disability weights, as it is highly probable these cases are within the studied material.

The age of patient will not be considered because age weighting and discount rate has been omitted and thus give no additional effect based on the productivity of the individual.

Through the prevalence approach, YLDs can be estimated to be 57 for construction workers in 2013, see Table 2 in Annex. This rather minute result stems from the fact that a very small amount of injuries could be directly confirmed to be work-related, that the injuries only result from trauma induced accidents, and that the injuries are assumed to be of relatively short duration. Inclusion of more minor injuries such as cut wounds would only affect the YLD estimate by a small amount and because of the even shorter recovery rates would hardly cause workers to leave work.

If we instead turn to the GBD study from 2013 (IHME, 2014) the proportionate YLD in the construction sector from falls is 445, given that the construction sector in Qatar is about 28 percent of the whole population. This means that construction workers endured at least 3600 falls, which is much greater than the 800 occupational fall injuries recorded over 3 years in Al Thani et al. (2015), and also more than Bener et al. (2012) recorded. Al Thani et al. (2015) states that 30.7 percent of trauma injuries are occupational, which would result in 3991 of the falls in the GBD study to be from occupational hazards. From here, not all of these falls can be expected to occur in the construction sector.

Besides fall injuries, the ability to credibly relate the GBD injury statistics to occupational hazards becomes increasingly difficult. Many injury incidences are zero or close to zero meaning that an inclusion of such statistics would affect the final DALY result by an insignificant amount. Others, such as traffic injuries or unintentional injuries, are too unspecific to be able to classify as occupational injuries.

Cardiac arrests have the potential of causing significant health problems for construction workers, especially when the prevalence for heart disease could be high. However, as Patel et al. (2014) noted the mean hospital stay for patients admitted between 1991 and 2010 was 6.4 days. Even with the assumption that all cardiac arrests were induced by working conditions and that for the duration of their hospital stay they would experience severe cardiac arrest, the YLD generated would be close to 100. Still, the in-hospital mortality rate for these cases was 59.8 percent. This increases the risk of cardiac arrests generating YLL, as discussed above.

Moving on to India are occupational injuries equally difficult to gather. No national institute that provides injury statistics for workers. However, previously mentioned articles used for estimation of YLL can be used here to estimate YLD for the nation of India.

Hämäläinen et al. (2006) estimates that 8763 incidents occur per 100 000 workers in India giving a total number of injuries in the construction sector to be at least 3 036 000, which in turn generates 374 499 YLD. It is here assumed that injury site follows Bener et al. (2012). In comparison to Qatar, this distorts the picture as this with high certainty also includes occupational diseases. Biswas et al. (2014) proposes instead that 17 million occupational injuries occur each year in India which would generate 183 264 YLD for the construction sector. However, Leigh et al. (1999) uses the same figures suggesting that these numbers are outdated and thus strongly limits the accuracy of the estimate. One reason for this could be the informal structure of the work force and thus the difficulty gathering occupational injuries. Moreover, Leigh et al. (1999) suspects that this number is far too low.

The only nation-wide estimate of disease and injury from 2013 is the GBD study (the Indian government provides no injury statistics). If YLD is gathered from here and same categorization is used as from Al Thani et al. (2015) to simplify the comparison, the years lived with disability is 1 910 250. This is about 5 times higher than ILO (2008) and other estimates, even when it has been narrowed down to only include four suspected occupational injuries and their effect on males between the age of 15 and 59. Additionally, occupational diseases have not been included in the GBD

number, but are suspected to be significant (ILO, 2008). Finally, cardiovascular disease is not included either, but as mentioned before the GBD study suggests that cardiovascular disease is a bigger contributor to YLD in India than in Qatar and therefore increase the relative harm even more.

DALY

Given the different estimates for years of lost life and years lived with disability, values for DALY in the construction sector can be determined. First, from Al Thani et al. (2015) the DALY in the construction sector in Qatar in 2013 is 1 468, see table 3 in Annex.

The minimum DALY from DLA Piper (2014) is 454, yet as Hamad Trauma Center is used and that only three nationalities are discussed the YLL is likely higher. No statistics on injuries is given and therefore can YLD not be determined. However, DLA Piper is aware of the potential of injuries. It is therefore likely that a DLA Piper estimate would be close to the Al Thani et al. estimate with additional capacity for cardiac arrests.

DALYs presented in the GBD study from 2013 (IHME, 2014) with respect to the categorization of Al Thani et al. (2015) is 22 955 in four categories: Falls, Foreign body, Exposure to mechanical forces, and Motor vehicle accidents. Special reservation for the presented YLD as this is for the whole population, yet the statistics show that for these accidents around 90 percent of YLD occurs for men. YLL is gathered for male between the age of 15 and 59.

The presented DALY statistics from GBD needs to be adjusted by the size of the construction sector, which represents 43 percent of all males between the age of 15 and 59. As such, 9 882 DALY is more representable for the construction sector, however as Bener et al. (2012) noted are construction workers more exposed to these risks and thus it would be possible for the DALY to be higher.

Amnesty (2013) listed 174 Nepalese deaths in 2012, which is confirmed by statistics in DLA Piper (2014). Amnesty does not mention to what proportion these deaths are work-related but a significant portion can be expected, something that has been discussed earlier as unverifiable. The following DALY will need to be inexact when assumptions are broadened and by not being able to determine the extent suffered by construction worker nor the rate of mortality from work-related incidents.

DLA Piper (2014) confirms through Supreme Council of Health in Qatar that 964 foreigners died in 2012 and 2013, with missing data from Bangladesh in 2013. Further, Amnesty quoted a survey from 2011 stating that 11 percent of all migrant workers have been injured at work (2013, p. 46), resulting in a DALY score of 34 208.

The DALY in India (as seen in Table 3 in Annex) is higher than many estimates from Qatar, with the GBD study being 3.8 times higher per 1000 worker than its counterpart in Qatar. Legitimate concern about the occupational characteristics still exist with these estimates but an indication about the occupational hazards in the two countries can be imagined.

Economics of DALY

As can be seen from the previous chapter, the experienced DALY for the construction workers in Qatar is quite large but not unthinkably large when compared to India. From India comes around 500 000 foreign workers to Qatar and their experience in Qatar might not be as detrimental as Amnesty (2013), HRW (2012), and ITUC (2014) project. From this paper's estimates is it hard to determine whether the construction sector in Qatar is more hazardous than India. To be able to separate the sectors one additional variable will be look at, wage.

YLL times wage would be the amount of money the workers could earn if the construction sector was safer and the loss of life decreased. YLD times wage is harder to define, as it is not certain that a worker will be away from work and thus he could still earn money while suffering YLD. Hämäläinen et al. (2006) defines accident, as

being away from work for more than 3 days, which limits the extent YLD is relevant. Additionally, is it no clear the average length of injury but it is assumed to not be more than one year. As such, this paper is unable to determine to which extent a worker is absent and as a result, the worker can still earn money while being affected by a disease or injury. YLD time wage will therefore be interpreted as the value of the disease period.

One additional thing that needs to be considered when it comes to the role wage has on the workers is the informal structure of Indian work force. This means that the workers have very limited access to unions and safety insurances. A similar situation is reported to occur in Qatar. It is therefore a probable assumption that hospital costs fall upon the workers and not the employers, as long as not compensation is given at a later stage, something DLA Piper (2014) suspects Qatar tries to limit.

However, as wage times DALY is a hypothetical situation, the actual rate of absentees serves no real benefit to this analogy. Instead, the value of DALYs experienced, in terms of wage, serves as an indication to the personal harm. Not only by injuries, as DALY presents, but also in personal commitment and risk preference.

Risk adverse behavior could be the determinant for the migrant workers in Qatar, however economic risk aversion provides an additional aspect as it is difficult to provide a clear view of which sector does more harm.

To show the difference in the economic value for a person at these two environments the following formula can be used:

$$\frac{Wage \times DALY}{Number\ of\ Workers}$$

where wage is the reported and average wage in one year in US dollars, DALY is this paper's estimates on DALY, and number of workers are the workers in the construction sector in Qatar and India. The resulting estimate is the average economic value of the DALYs experienced by each worker. However, this equation suffers by projecting misleading results as if wage decreases and DALY increases while workers remains the same, the result would be the same. This is bad as it gives no clear view

of which situation is better. Therefore, an alteration to the equation is made so it looks like this:

$$\frac{Wage}{\left(\frac{DALY}{Number\ of\ workers}\right)}$$

With this formula is a number interpret as the wage a worker receives given the included the risks, and thus a higher number is better.

Given the different DALY and wage statistics, a figure of DALY value can be calculated. Such is visible in the Annex by the name of Figure 1, where red represent estimates from Qatar and blue is from India. This figure is presented through where the DALY is gathers, however for the case of Qatar as the wage not known for Non-Qatar have three different wage scenarios, US$160, US$300, and US$1290, been used.

Al Thani et al. (2015) with the wage scenario of US$1290 resembles most an official prediction from the Qatari government as all data is gather from state statistics. With this comes an additional consideration for potential cardiac arrests and other occupational diseases that are absent in the statistics. This leads to the wage gained by the worker being higher in all wage scenarios, as seen in Figure 1. With this can be said that the risk experienced by a worker in Qatar is valued than in India. It can be expressed as saying that the risk endured in the construction sector in Qatar has a higher economic pay-off compared to working in India. And as such, it gives an incentive for foreign workers to travel to Qatar in search for work.

What is apparent from Figure 1 is that wage is the variable that separates the two countries. If US$1290 is the actual salary given to workers, is the economically most viable action to work in Qatar. Even when comparing results from Amnesty (2013), where occupational disease is included, and Biswas et al. (2014), where it is not, is it of more value to work in Qatar.

If instead wage is allowed to differ, the picture becomes ambiguous. If also recalled that DLA Piper (2014) and Bener et al. (2012) lack essential parts of the DALY

expression, and that Al Thani et al. (2015) with high certainty are selective with injury inclusion, the picture becomes more ambiguous.

However, one very important part to remember is that the workers most probably do not know the full situation. As ITUC (2014), HRW (2012), Amnesty (2013), and UN (2014) all report is that workers are promised one wage and are given another, that additional costs have been forced upon them, that the working environment is more hazardous than they are aware of, and that they have very few legal rights. All would influence workers in their choices to come to Qatar, however this discovery often come too late and thus cannot be used to explain migration movements.

Conclusions

This work has been to investigate working conditions in Qatar and provide an economic perspective to why migrant workers are in Qatar, while also reviewing the work environment present in Qatar. After review, it appears that there is some merit as to why migrant worker inflow is still high.

The main issue with this paper's estimates is the lack of certainty into which of these reported disabilities are occupational. As such, a more narrow prediction as to the worker well being decreases the confidence of the interval. To this effect, this study refrains from further suggesting the actual well being of workers and leaves speculations to the reader. Yet, some things need to be explained about this paper's results and the implications of this result.

One thing is essential for the reader to realize, the extent of the missing data. This is apparent in Table 3 where three of the estimates lack parts of the DALY formula. Others include occupational disease that is not present in all estimates. Age at time of disability, length of disability, and resulting injury all are notoriously problematic to gather in these two countries and the resulting estimates are impaired. Sensible assumptions have been made when information is lacking, however to fully understand the situation and to evaluate its effects more data is needed. DLA Piper (2014) demands more third party oversight and ILO (2005) questions India's

reporting and this paper can thus only give an indication to the characteristics of the construction sectors in Qatar and India.

This paper reveals a different perspective on DALY calculations than other studies using GDP as its economic variable. There is no presentation in this paper on the costs of having these DALYs in Qatar, nor gives any societal losses of this labor practice, but what other studies lack that this study can give is a sensible prediction to future economic assessments. GDP serves as a metrics on the economic loss but it gives no account to the choices within the system and it cannot explain this labor movement. In the case of Qatar, as it has been suggested that workers pay potentially all hospital costs, removes one of the predictable strengths with using GDP as a metric. This only leaves workers absent from work affecting GDP, something that is of limited concern as for the shortness of disease length.

Wage as in Figure 1 needs some explanation. At first glance, the wage given to workers might seem astronomical and in this configuration; it is. However, this not the actual salary given to worker but the interpretation is instead the wage given to each worker had DALY been 1 for everyone. As this is an impossibility as some workers are still alive and the intrinsic property of DALY to be less than 1 per person over a whole population, elevates the wage statistics above actual payments. This is then multiplied by the fact that far from every disability is included in this estimate. The usefulness of this figure is not to show wage statistics but instead the relative difference between wage and DALY and between Qatar and India. Therefore, the figure shows that it is of higher benefit for a worker to work in an environment presented by Al Thani et al. (2015) than in an environment explained in ILO (2008).

However, one interesting aspect of this calculation is if wage is excluded, the remaining equation shows the number of DALYs for one worker given the included disabilities. If this is then compared between countries, a health gap appears. For example gives GBD study 2013 from Qatar DALYs equal to 0.017 while the same study for India gives 0.067. As these are highly compatible statistics, the resulting difference of 0.05 can be viewed as the difference in life quality between the countries. In this case is the experienced DALY less in Qatar for the included

disabilities. This health gap is worth investigating for more countries and can serve as an additional metrics for future QALY research.

Occupational disease is the biggest question remaining that would benefit more research, both in Qatar and India. Extensive disagreement about the presence of occupational disease in Qatar leads to an uncertainty about the actual well being of the construction workers. According to ILO (2008) constitutes occupational disease almost 90 percent of all occupational deaths. However, there is struggle to determine if a disease is occupational or not, especially if the disability occurs years after the exposure. Asbestosis and cancer are examples where this can be difficult and since this paper has not provided primary data and has limited insight into hospital admissions, it is impossibility to determine their prevalence. Occupational disease is therefore classified in this paper to a broader perspective than would be liked. Deeper research is needed in this field but there is fear that if the labor market remains the same and hospital reports remain biased not much more can be known.

An analysis of the implications of Figure 1 shows an example of economic preference and economic risk assessment. ITUC (2014), among others, provide evidence that contracted salary is different from paid salary so it is reasonable to assume that the promised salary for workers is near the US$1290 wage scenario. Given that, no matter the actual DALY in the construction sector in Qatar, it is of higher economic benefit to work in Qatar than in India if they receive the higher wage scenario. This can therefore be a probable explanation to why worker inflow remains high as workers might travel thinking they will receive this salary. The workers are then acting accordingly to economic theory, given a fully flexible labor market. They move to where wage is highest and risk is lowest.

The employers, more controversially, also act economically viably. Higher employment cost equal lower profit so if salaries were to decrease they would be more successful in attracting investor; something essential for a chance of completing the necessary builds before FIFA World Cup 2022. With no real threat from supranational organizations and no credible harm from the outside world, there is no risk in lowering salaries. There is no penalty to breaking contracts and since there are

reports of confiscated passports (ITUC, 2014), their work force is stable. Additionally, with no contracts, the liability disappears from the employers meaning that housing and hospital costs are transferred to the workers while deaths and DALYs can be classified as non-occupational.

Moreover, this situation can be considered in terms of a high supply of labor, which gives the market power to the employers. If one worker were not willing to accept the conditions another worker that is gets the job and if the work environment is equally hazardous while salary is lower that would affect the possibility to provide for one's family. As proposed before, that there is a misalignment of DALY and wage might not be true. It is more probable that the labor market is strongly skewed towards the benefit for employers.

This situation says something about the work environment in India as well and where people focus their attention. The fact that Indian travel to Qatar, which Human Rights Watch describes "as modern-day slavery" (2012, p. 35), even if workers are not fully aware of the situation, suggests that being a construction worker in India is even worse. But the Guardian does not write about that and there are no calls for international intervention. Further, this study found few academic articles about Indian occupational disabilities, which is evident in the outdated reference materials. In a country that is soon to be the most populous country on the planet, it is shocking to note that their labor force statistics are almost on par with Qatar's.

Much focus is put on Qatar by being accused of slave-like practices, yet as this paper shows is the relative well being not too different to India. This might be explained by the western interests in the area in the form of a World Cup but no such interest exist in India. Because of the informal work sector, the Indian government cannot be blamed in the same way and because much of the world economy depends on the current Indian work structure, maybe it is better to turn a blind eye. Even if that is potentially deadly for individuals. The gloomy reality to this is that even if Qatar is forced into implementing better working conditions and a better reporting, the hazardous existence for the workers remains, in India. Qatar is not the cause of this

situation but instead takes advantage of the economic reality for maximum economic gains.

This paper concludes that the construction sector in Qatar is of questionable characteristics and than many workers might live in a less than optimal situation. However, when comparisons are made with India, from where around 500 000 foreign workers originate, the issue becomes more complicated. There seems to be no disagreement that the workers live in subpar conditions but it also appears that the workers came from subpar conditions. If economic incentive is considered it brings about previously unexplored personal choices that point in a direction that is consistent with the current migrant flow.

Further research in this field is essential, for example comparing Qatar with other migrant countries such as Nepal or conducting a similar study centered on the migration situation in Singapore.

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Annex

Table 1

YLL, Qatar

2013 Construction Sector	Workers	Deaths	Deaths per 1000	Life expectancy	Disability weight	YLLs	YLLs per 1000
15-19	5,498	4	0.72	67.3	1.00	266	48
20-24	70,296	51	0.72	62.4	1.00	3,152	45
25-29	109,589	79	0.72	57.5	1.00	4,528	41
30-34	135,177	97	0.72	52.7	1.00	5,119	38
35-39	84,276	61	0.72	47.8	1.00	2,895	34
40-44	69,357	50	0.72	43.0	1.00	2,143	31
45-49	40,571	29	0.72	38.2	1.00	1,114	27
50-54	24,018	17	0.72	33.5	1.00	578	24
55-59	17,889	13	0.72	28.9	1.00	371	21
Total	**556,671**	**400**				**20,165**	**36**

Table 2

YLD, Qatar

2013 Construction Sector	Injury location	Percent of total injuries	Prevalence of injury	Disability weight	YLDs	YLDs per 1000
556,671	Head	15.5%	71.27	0.073	5.20	0.009
	Face	9.3%	42.94	0.173	7.43	0.013
	Neck	3.2%	14.56	0.369	5.37	0.010
	Chest	5.5%	25.29	0.352	8.90	0.016
	Abdomen	2.4%	11.26	0.009	0.10	0.000
	Spine	5.4%	24.93	0.132	3.29	0.006
	Pelvis	1.8%	8.31	0.390	3.24	0.006
	Shoulder	4.1%	18.89	0.080	1.51	0.003
	Upper arm	4.5%	20.56	0.053	1.09	0.002
	Elbow	3.0%	13.74	0.087	1.20	0.002
	Lower arm	4.3%	19.89	0.065	1.29	0.002
	Wrist hand	9.0%	41.20	0.025	1.03	0.002
	Hip	3.4%	15.52	0.017	0.26	0.000
	Femur	2.1%	9.48	0.308	2.92	0.005
	Knee	3.9%	17.83	0.129	2.30	0.004
	Lower leg	6.8%	31.11	0.087	2.71	0.005
	Ankle	6.7%	30.97	0.087	2.69	0.005
	Internal	0.6%	2.91	0.171	0.50	0.001
	Other	5.3%	24.33	0.145	3.53	0.006
	Unknown	3.3%	15.02	0.145	2.18	0.004
Total		**100%**	**460**		**57**	**0.102**

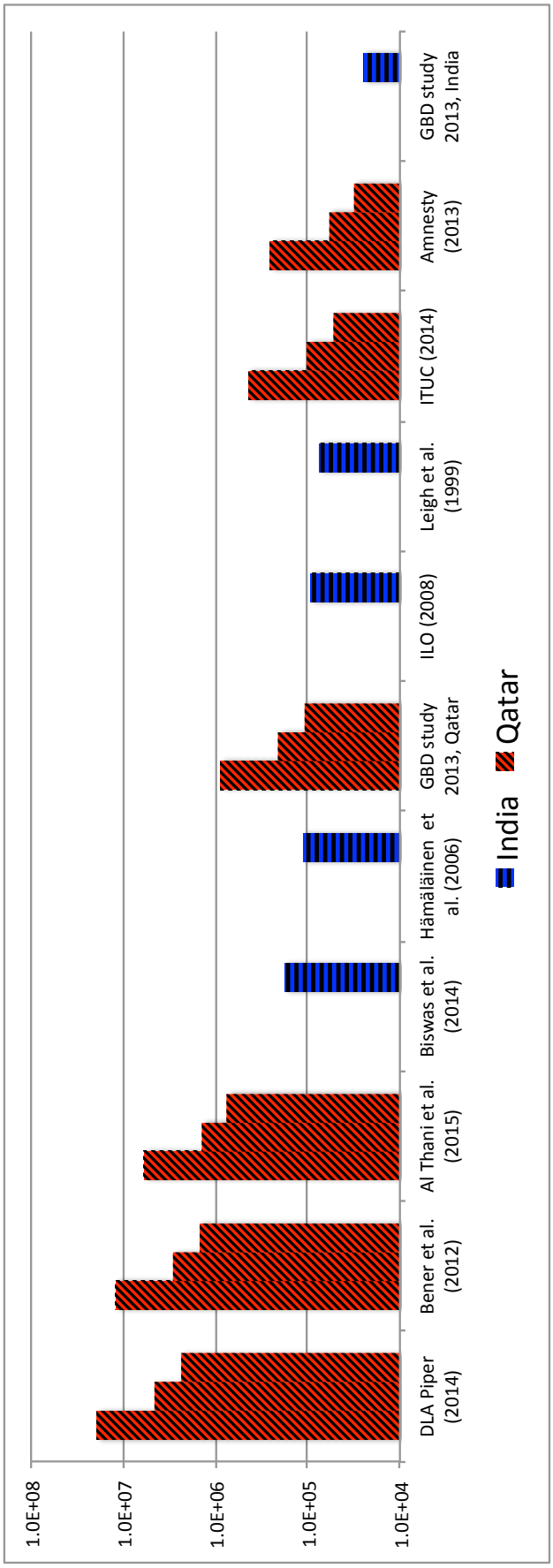
Table 3

Total DALY

Construction Sector Qatar	Workers	YLL	YLD	DALY	DALY per 1000
DLA Piper (2014)	556,671	454	-	**454**	0.82
Bener et al. (2012)	556,671	-	723	**723**	1.30
Al Thani et al. (2015)	556,671	1,412	57	**1,468**	2.64
GBD study 2013	556,671	7,988	1,894	**9,882**	17.75
ITUC (2014)	556,671	20,165	-	**20,165**	36.23
Amnesty (2013)	556,671	26,518	7,690	**34,208**	61.45
India					
Biswas et al. (2014)	35,000,000	148,523	183,264	**331,787**	9.48
Hämäläinen et al. (2006)	35,000,000	150,504	374,499	**525,004**	15.00
ILO (2008)	35,000,000	155,141	475,409	**630,550**	18.02
Leigh et al. (1999)	35,000,000	547,911	228,002	**775,913**	22.17
GBD study 2013	35,000,000	450,863	1,910,250	**2,361,113**	67.46

Underlined include occupational disease

Figure 1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DLA Piper (2014)
Bener et al. (2012)
Al Thani et al. (2015)
Biswas et al. (2014)
Hämäläinen et al. (2006)
GBD study 2013, Qatar
ILO (2008)
Leigh et al. (1999)
ITUC (2014)
Amnesty (2013)
GBD study 2013, India
India
Qatar