Trends and projections of universal health coverage indicators in Iraq, 2000–2030: A national and subnational study

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ABSTRACT

Introduction: Iraq has had limited access to healthcare services due to successive conflicts and political turmoil. Since 2018, Iraq has embarked on a new reconstruction process which includes a goal of 100% immunisation against certain diseases in 2030. We aimed to undertake a comprehensive assessment of Iraq's progress towards universal health coverage (UHC) targets that could contribute to Iraq's policy and strategies.
Methods: We estimated the coverage of UHC indicators from six nationally representative population-based household surveys in Iraq during 2000–2018. We employed 14 health service indicators and two financial risk protection indicators in our UHC progress assessment. We used a Bayesian hierarchical regression model to estimate the trend and projection of health service indicators.
Results: Improved water sources, adequate sanitation, institutional delivery, skilled birth attendants, and BCG reached the 80% targets in 2018, and are projected to maintain their status in 2030 at national and subnational levels. Family planning needs satisfied, acute respiratory infection treatment for pneumonia, and oral rehydration therapy will be much less than 80% in 2030. 12% of Iraqi households incurred catastrophic health expenditures in 2012, which was a fourfold increase from 2007. Some governorates faced ten- to twentyfold increases in catastrophic health expenditures, for example, from 0.8% to 15.9% in Diala. Approximately 3% of non-poor households became poor due to out-of-pocket (OOP) payments in 2012.
Conclusion: Without proactive strengthening of the healthcare systems, achieving UHC in Iraq by 2030 would be a challenge. Worsened trends were observed in both conflict-affected and underdeveloped areas in health service coverage and financial risk protection. Recovery of GDP spending on health and pre-pooled financing mechanisms should be introduced for OOP payment reduction. Prioritising nationwide primary healthcare services and regulating public-private role-allotment in the health sector are crucial in improving low coverage indicators and decreasing disparities among governorates.

1. Introduction

Universal health coverage (UHC) is a global health priority and one of the major targets for the Sustainable Development Goals (SDGs) (United Nations, 2015). UHC ensures that all citizens have access to quality health services without financial risk when they use those services. Under SDG3, the World Health Organisation (WHO) and The World Bank defined a set of UHC targets for United Nations (UN) member states to achieve by 2030: (1) at least 80% essential health service coverage for the entire population of the country, irrespective of economic status, gender, and place of residence (equity); and (2) 100% protection from catastrophic and impoverishing health payments by 2030 (Boerma et al., 2014; World Health Organisation, 2019c).

Iraq has 39.3 million citizens as of 2019 (United Nations, 2019b). The country is administratively structured by 19 governorates. The Kurdistan Region includes Duhok, Sulaimaniya, Erbil, and Halabja governorates to form its own autonomous government. 71% of Iraqis reside in urban areas, with more than half of the urban population living

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in slum-like conditions (United Nations, 2019a). Life expectancy at birth was 70.0 years (68.4 years in male, 72.5 years in female) in 2017 (The World Bank, 2019). Literacy rates have greatly fluctuated, measuring 50.1% (56.2% in male, 44.0% in female) in 2018 (UNESCO, 2019). In the late 1970's, Iraq's health systems ranked among the top in the Middle East and North Africa region. Since then, however, Iraq has suffered political turmoil and a series of wars and conflicts. Essential infrastructure, including the healthcare system, was severely damaged and many skilled health professionals fled the country (Al Hilfi et al., 2013). In addition, the violence and insecurity created a number of internally displaced people (IDPs), refugees and mounting humanitarian needs. As of August 31, 2020, the country had 1.4 million IDPs in and out of camps, and 4.7 million returnees, although the number of IDPs has declined since July 2017 with 3.4 million IDPs (IOM, 2019).

Public facilities provide free healthcare services. However, they are not equitably distributed across governorates (Ministry of Health Iraq, 2014). Moreover, Iraq's so-called "dual practice", where health staff employed in the public sector also provide services in the private sector, has caused a shortage of human resources in the public sector (Anthony et al., 2018; Ministry of Health Iraq, 2014). People tend to visit private facilities due to a perception of poor quality and long waiting time at public facilities (Ministry of Health Iraq, 2014; Moore et al., 2014). The country has not developed a pre-pooled mechanism for the health financing system. The proportion of health expenditures out of GDP spending remains low (4.2% in 2017), and health expenditure per capita was at the lowest level among the upper-middle income countries in 2016 (World Health Organisation, 2018, 2019b). As a result, the major source of financing for healthcare is out-of-pocket (OOP) payments. The share of OOP health spending among total health expenditures increased from 29% in 2004 to 78% in 2016 (World Health Organisation, 2019b).

To restore the public health system damaged by the war, Iraq's Ministry of Health (MoH) developed the National Health Policy 2014–2023 with the objective of achieving UHC as a core element even before the SDGs were launched. However, the healthcare systems have not yet been fully restored. Health Cluster, an inter-organisational health partnership in humanitarian emergencies, has worked on the Health Emergencies Programme and Essential Package of Health Services (EPHS) expansion together with Iraq MoH and other actors as part of the humanitarian response and development planning to secure progress towards UHC (Global Health Cluster and WHO EPHS Task Team, 2018; International Committee of the Red Cross, 2019; Médecins Sans Frontières, 2019; OCHA, 2019b). In July 2019, WHO presented that it would shift their support from the emergency phase to the emergency and developmental phase, keeping UHC as a core objective (World Health Organisation, 2019d).

In order to achieve the proposed goal, it is essential to monitor and evaluate progress towards UHC. To date, many studies have assessed emergency situations in Iraq, and some studies have assessed the limited number of UHC-related indicators in Iraq using specific data points (Hussain and Lafta, 2019; Lafta et al., 2015; Lafta and Hussain, 2018; Ministry of Planning and Development Cooperation Iraq, 2005; OCHA, 2019a; World Health Organisation, 2019c; World Health Organisation Iraq office, 2008). However, no study has comprehensively assessed the trends and progress towards UHC at the national and subnational levels using nationally representative survey data. This study is the first to examine trends in health services and financial risk protection indicators in Iraq, with projections for health service coverage by 2030 at both the national and subnational levels.

2. Methods

2.1. Data sources

We used data from six nationally representative population-based household surveys in Iraq to estimate trends and projections of UHC indicators at both the national and subnational levels. To estimate

coverage of health service indicators, we employed Multiple Indicator Cluster Survey (MICS) in 2000, 2006, 2011, and 2018. For the assessment of financial risk protection indicators, we used Household Socio-Economic Survey (HSES) in 2006–2007 and 2012. All surveys in the analysis used multi-stage cluster sampling design and had high response rates (more than 97%). With the survey data, proportional data were created and then used for estimates and projections. A brief description of these surveys is available in the Appendix (Section 1). Halabja, the newest governorate approved in August 2018, was regarded as part of Sulaimaniya until 2018 in the surveys that were used by this study.

2.2. Measurement of UHC

Following the WHO guidelines as well as examining Iraq context and data availability, we included 14 indicators - including maternal and child health and environmental indicators - in this study (Table 1). The UHC Service Coverage Index with 16 tracer indicators is useful for the overview of changes with time and comparison with other counties at a glance. However, we aimed to realise estimates and projections at both the national and subnational levels by using primary country data at the individual level in hopes that the study could be practically useful for policy makers and partners. MICS survey data meet this criterion, but some of the 16 indicators or data pertaining to some indicators in some years were not available. Meanwhile, we added other important indicators such as delivery care and child immunisations. These health interventions benefit every individual in every country, regardless of the country's level of socioeconomic development, epidemiological circumstances and type of health system it may have (World Health Organization and The World Bank, 2015).

In line with previous studies (O'Donnell et al., 2008), financial hardship was assessed with two indicators: incidence of catastrophic health expenditure and incidence of impoverishment. A household's OOP payments for healthcare are considered as catastrophic health expenditure if they exceed a certain threshold value of either total household consumption, non-food consumption or a household's capacity to pay (O'Donnell et al., 2008). In this study, we used 10% of total household consumption expenditure to estimate incidence of catastrophic health expenditure at the national and subnational levels. A health expenditure is defined as impoverishing when a non-poor household becomes poor due to OOP payments for healthcare (O'Donnell et al., 2008). The details of the measurement procedure for catastrophic health expenditure and impoverishment are found in the Appendix (Section 2).

2.3. Predictor variables

This study aimed to reflect the associations between displacement and health in assessing UHC trends and projections in Iraq. To identify feasible predictor variables, we examined possible variables and their data availability. For health service trend and projection analysis, we selected three predictor variables: the numbers of IDPs, population density (both at subnational level), and total health expenditure per capita (at national level) from 2000 to 2018 (Appendix, Section 3).

2.4. Statistical analysis

Predictor variables used in the trend analysis were projected up to 2030 using a Bayesian hierarchical regression model:

$$y_{ijk} = \alpha_{jk} + \beta_j year_i + \varepsilon_{ijk}$$

where y is the logit-transformed probability of the population density, population movement, or total per-capita health expenditure variables for i:th year, j:th governorate and k:th region. α_{jk} is the random component of the j:th governorate in k:th region. β_j is the random component of the time slopes (year) for j:th governorate. ε_{ijk} is the

Table 1

Health service indicators.

Indicators	Definition
Environment (2)	
Improved water sources	The proportion of households whose main source of drinking water is an improved source, including piped water, tube well/tube-hole, protected well, protected spring, rain water collection, tanker truck, cart with small tank, water kiosk, bottled water and desalinised & sterilised water
Adequate sanitation	The proportion of households with improved toilet facilities, including flush toilets with piped to sewer system, septic tank, or Don't know where as well as pit latrines with slab, ventilated improved pit latrine, or composting toilet
Maternal health (5)	
Family planning needs satisfied	The proportion of married women aged 15–49 who do not want any more children or want to wait 2 or more years before having another child and are using modern contraception
ANC1	The proportion of women age 15–49 years with a live birth in the last 2 years who during the pregnancy of the most recent live birth were attended at least once by skilled health personnel
ANC4	The proportion of women age 15–49 years with a live birth in the last 2 years who during the pregnancy of the most recent live birth were attended at least four times by skilled health personnel
Institutional delivery	The proportion of women age 15–49 years with a live birth in the last 2 years whose most recent live birth was delivered in a health facility
Skilled birth attendance	The proportion of women age 15–49 years with a live birth in the last 2 years whose most recent live birth was attended by skilled health personnel (doctor, nurse or midwife)
Child heath (7)	
BCG	The proportion of children age 12–23 months who received BCG containing vaccine at any time before the survey
DTP3	The proportion of children age 12–23 months who received three doses of DTP vaccine (diphtheria, tetanus, pertussis) before the survey
Polio3	The proportion of children age 12–23 months who received three doses of polio vaccine before the survey, regardless of whether IPV or OPV
Measles	The proportion of children age 12–23 months vaccinated against measles at any time before the survey
Full immunisation	The proportion of children age 12–23 months who received three doses of DTP and Polio vaccines and one dose of BCG and measles vaccine before the survey
ARI treatment	The proportion of children under age 5 with suspected pneumonia (cough and difficult breathing NOT due to a problem in the chest and a blocked nose) in the last 2 weeks who received antibiotics
Oral rehydration therapy	The proportion of children under age 5 with diarrhoea in the last 2 weeks who received oral rehydration therapy (oral rehydration solution, ORS packet, pre-packaged ORS fluid, home-made ORS, any ORS, recommended homemade fluid or increased fluids) and continued feeding during the episode of diarrhoea

ANC1, at least one antenatal care visit; ANC4, at least four antenatal care visits; IPV, inactivated polio vaccine; OPV, oral polio vaccine; ARI treatment, acute respiratory infection treatment for pneumonia.

residual of the hierarchical model. The projection estimates were merged with health service indicators to develop the complete data set.

Considering the hierarchical structure of the data, the Bayesian hierarchical linear regression model was developed with random intercepts and random slopes at the governorate level. All individual observations were nested in their respective governorate and all governorates were again nested as a country. Our projection model was based on the assumption of unchanged policy in the near future. The

following model was used to estimate the trend in, and projection of, health service indicators up to 2030 at governorate level:

$$y_{ijk} = \alpha_{jk} + \beta_j year_i + \delta_{j1}PD_{ij} + \delta_{j2}PM_{ij} + \gamma_j THE_i + \varepsilon_{ijk}$$

where y is the logit-transformed probability of health service indicator in i:th year for j:th governorate in k:th region. α_{jk} is the random component of the j:th governorate in k:th region. β_j is the random component of the time slopes (year) for j:th governorate. δ_{j1} is the random coefficient of the population density (PD) in j:th governorate. δ_{j2} is the random coefficient of the population movement (PM) in j:th governorate. γ_j is the random coefficient of total per-capita health expenditure (THE) for j:th governorate. ε_{ijk} is the residual of the hierarchical model. The governorate-level mean was assumed to be normally distributed and non-informative prior was applied. The model assumed that the effects of predictors were the same across governorates. The predictor variables were determined based on the previous literature, correlation, and Deviance Information Criteria (DIC).

Trace plots were checked visually to assess convergence of Markov chain Monte Carlo (MCMC) output for each of the Bayesian models. When the outputs from two chains adjoined, the posterior samples were considered to have converged (Gelman, 2013). A potential scale reduction factor (PSRF) is used in the Gelman-Rubin diagnostic, where a PSRF value close to 1 indicated convergence, and a PSRF value less than 1.02 identified convergence failure (Gelman, 2013). To examine the validity of the models, we plotted our predictions versus the observed data across governorates and by year. We calculated bias (mean error), total variance (root-mean-square error), and 95% data coverage within prediction intervals. Stata/SE version 15 was used for data management. Bayesian models were developed in JAGS version 4.3.0 and implemented in R version 3.6.1.

3. Results

3.1. National coverage of health service indicators

Table 2 shows the national coverage of health service indicators and the national-level average annual rates of change for each indicator from 2000 to 2030. If the current trend continues, of the 14 indicators, only institutional delivery, skilled birth attendance (SBA), BCG, improved water sources, and adequate sanitation at the national level are projected to achieve the 80% coverage by 2030. In 2030, the indicator with the lowest coverage will be acute respiratory infection treatment for pneumonia (ARI treatment) (24.8%), followed by family planning needs satisfied (40.5%) and oral rehydration therapy (60.3%). ANC visits and all childhood immunisations except BCG will not meet the 80% coverage by 2030. At least one ANC visit (ANC1) reached 80% in 2018, however, it is predicted to decline to 78% in 2030. At least four ANC visits (ANC4) faced a significant drop from 69.0% in 2000 to 58.5% in 2018, and it will affect coverage in 2030 (64.8%). The coverage of oral rehydration therapy will increase with the highest annual rate of change (4.1%) from 2000 to 2030. However, oral rehydration therapy had very low coverage (18.1%) to begin with in 2000, so it will not meet its target by 2030. Family planning needs satisfied will decrease with the highest annual rate of change (−2.3%) for those thirty years.

3.2. Subnational coverage of health service indicators

Figs. 1–2 and the Appendix (Figure A4.1) present the predicted coverage of maternal, child health and environmental service indicators at the subnational (governorate) level in 2000, 2018, and 2030. Detailed trends and projections of all health coverage indicators for each governorate are also presented in the Appendix (Section 4). The coverage of institutional delivery, SBA, BCG, improved water sources, and adequate sanitation will all achieve the 80% target in all governorates by 2030. Most indicators show decreased gaps among governorates over time.

Table 2
National-level coverage of health service indicators and the annual average rates of change in Iraq, 2000–2030.

Health service indicators	Predicted coverage in year (95% Credible Interval)			Annual average rates of change
	2000	2018	2030	2000–2030
FPNS	80.7 (0.0–100)	53.6 (0.0–100)	40.5 (0.0–100)	−2.3
ANC1	72.1 (6.3–98.4)	81.5 (22.0–99.4)	78.3 (0.2–100)	0.3
ANC4	69.0 (8.3–98.4)	58.5 (3.9–96.9)	64.8 (0.1–100)	−0.2
Institutional delivery	45.7 (25.8–65.3)	86.3 (75.5–93.8)	94.5 (80.1–99.5)	2.5
Skilled birth attendance	71.7 (57.1–84.3)	95.1 (92.0–97.3)	97.0 (88.3–99.4)	1.0
BCG	85.5 (5.6–99.7)	90.3 (34.3–100)	86.1 (0.1–100)	0.0
DTP3	69.0 (41.6–87.7)	67.8 (47.1–82.6)	74.6 (22.1–97.8)	0.3
Polio3	48.7 (2.0–98.9)	73.4 (17.8–99.0)	74.0 (0.6–100)	1.4
Measles	77.6 (53.1–94.6)	71.3 (46.7–92.3)	73.7 (14.8–98.9)	−0.2
Full immunisation	46.5 (6.4–95.2)	59.0 (4.7–92.5)	64.7 (0.6–99.6)	1.1
ARI treatment	73.7 (0.0–100)	43.3 (0.0–100)	24.8 (0.0–100)	0.0
Oral rehydration therapy	18.1 (10.4–27.0)	36.5 (24.7–50.1)	60.3 (30.8–86.7)	4.1
Improved water sources	87.7 (80.5–92.1)	99.2 (98.9–99.5)	100 (99.9–100)	0.4
Adequate sanitation	73.8 (0.0–100)	88.9 (0.2–100)	81.6 (0.0–100)	0.2

FPNS, family planning needs satisfied; ANC1, at least one antenatal care visit; ANC4, at least four antenatal care visits; ARI treatment, acute respiratory infection treatment for pneumonia.

However, a wide variation is still observed in the coverage of DTP3, measles, and ANC4 among governorates in 2030. DTP3 coverage will reach the 80% target, or near it, by 2030 in only half of all governorates: Babil, Baghdad, Basrah, Diala, Duhok, Erbil, Karbala, Missan, and Sulaimaniya. Anbar and Nainawa show quite low coverage of DTP3 in 2018 and 2030, compared to in 2000. The coverage of measles immunisation will either decrease or remain unchanged from 2000 to 2030 in all governorates except Thiqur and Anbar. These two governorates show much lower coverage in 2018 and 2030 than in 2000 and will mark the lowest coverage among all governorates in 2030. Regarding the coverage of ANC4, around half of all governorates are predicted to achieve or near the 80% target by 2030, including Baghdad, Diala, Duhok, Erbil, Karbala, Kirkuk, Muthana, Thiqar, and Wasit. Despite recovery from 2018 to 2030, the remaining governorates could fail to reach the target.

3.3. Financial risk protection at the national and subnational levels

Fig. 3 presents the national and governorate level incidence rates of catastrophic health expenditure (A) and impoverishment (B) due to OOP payments in 2007 (left panel) and 2012 (right panel). At the national level, incidence rates of catastrophic health expenditure increased from 3.3% in 2007 to 12.4% in 2012, and the rate of impoverishment increased from 1.5% to 2.8%.

At the governorate level, the rate of catastrophic health expenditure was around 3% or less in most governorates except Qadissiyah (8.4%) and Basrah (7.1%) in 2007. However, the rates in 2012 range from around 9% (Anbar, Baghdad, Karbala, Muthana, and Thiqar) to around 16% (Diala), 17% (Erbil), 18% (Duhok), and 21% (Kirkuk). Diala experienced a twentyfold increase from 2007 (0.8%) to 2012 (15.9%). Regarding impoverishment, few differences were found across governorates between 2007 and 2012. The rates in 2007 ranged from 0.2% (Kirkuk) to 3.7% (Karbala). In 2012, the lowest impoverishment rate was in Najaf (0.8%) and the highest was in Duhok (4.6%), followed by Nainawa and Karbala (around 4%).
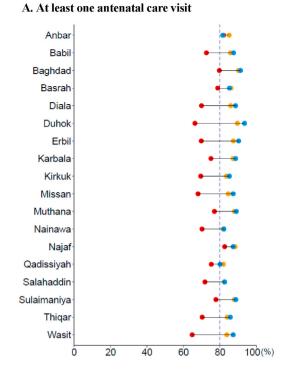
4. Discussion

This is the first attempt to assess trends in and projections of UHC in Iraq, at both the national and subnational levels. If current trends continue without proactive strengthening of the healthcare system, only five indicators, including institutional delivery, SBA, BCG immunisation, improved water sources, and adequate sanitation, are predicted to achieve the 80% target at the national and subnational levels by 2030. Although disparities in health service indicators by governorate decreased from 2000 to 2030, a wide variation among governorates is observed in the coverage of DTP3, measles, and ANC4 in 2030. Both financial risk protection indicators worsened from 2007 to 2012 at the national level. The incidence of catastrophic health expenditure among governorates varied from 9% to 21% in 2012.

This study found four types of health service coverage scenarios at the national and governorate levels from 2000 to 2030: (*a*) *predicted to achieve the target (institutional delivery, SBA, BCG immunisation, improved water sources, and adequate sanitation), (b) increasing coverage (Polio3, full immunisation, and oral rehydration therapy), (c) decreasing coverage (family planning needs satisfied, and ARI treatment), and (d) stagnant coverage (ANC1, ANC4, and DTP3 and measles immunisations).* EPHS for Iraq has covered comprehensive service components including maternal and child health, child immunisation, and environmental health. However, progress varies considerably among components.
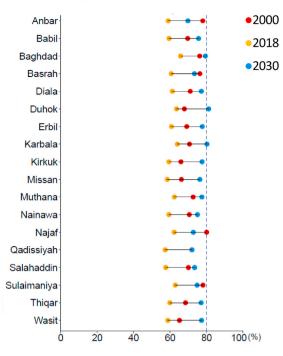
High predicted coverage for BCG, improved water sources, adequate sanitation and improving coverage for delivery care were mainly reflected by the efforts of the Iraq government and humanitarian sector in prioritising these health areas in emergency situations. To address the issues of limited access to healthcare due to wars, conflicts and sanctioned regime, Iraq MoH collaborated with local health authorities, UN organisations and NGOs to provide primary and secondary health services to affected people. In the severe emergency phase, operations targeted environmental services, maternal delivery care, and childhood immunisations, including support for continuation of the Expanded Program on Immunization (EPI) (Centers for Disease Control and Prevention, 2003; Ministry of Health Iraq, 2015; OCHA, 2019a). Increasing trends of Polio3 coverage may be due to intensive measures under the Global Polio Eradication Initiative and early responses to the re-emergence of poliovirus (Global Polio Eradication Initiative, 2020; Mbaeyi et al., 2017). However, DTP3 and measles immunisation may be a challenge for caretakers to create vaccination opportunities for their children, particularly when they face insecurity, remoteness, and/or financial hardship (Ministry of Health Iraq, 2015; Médecins Sans Frontières, 2019; OCHA, 2019b). Several governorates including Ninewa, Salahaddin, Anbar, and Najaf were severely affected by the wars and conflicts; Muthana and Thiqar in the underdeveloped areas experienced worsened socioeconomic situations due to those conflicts (NGO Coordination Committee for Iraq, 2015). This study found that these governorates are projected to keep a lower coverage rate in DTP3 and measles immunisations than other governorates in Iraq.

In 2000, family planning needs satisfied, ANC, and ARI treatment marked decent coverage. However, in the midst of emergencies, the coverage of ANC became stagnant, and the coverage of family planning needs satisfied and ARI treatment worsened significantly. Similar trends were observed in violence-prone regions of Afghanistan, Pakistan, Syria, and Yemen from 2017 to 2019 (World Health Organisation and The
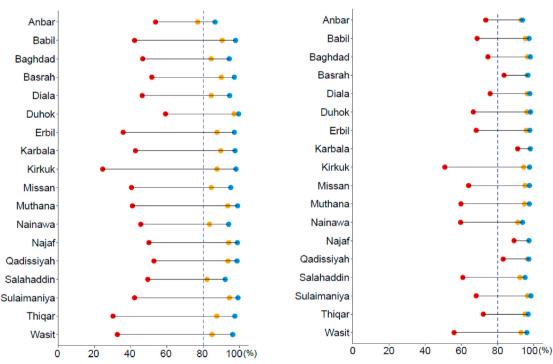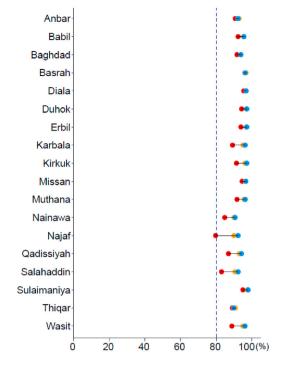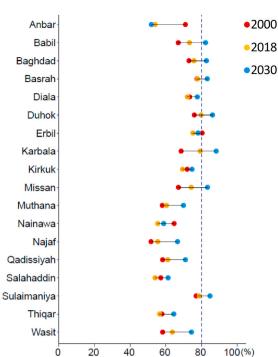
Fig. 1. Subnational-level antenatal and delivery care indicators in Iraq, 2000–2030.

World Bank, 2017; World Health Organisation, 2019c). Compared to delivery care, women tended to choose to private doctors more than public doctors for ANC visits (52.3%, 35.2% in 2018, respectively) (Central Organization for Statistics & Information Technology; Kurdistan Regional Statistics Office; UNICEF, 2019). This indicates that ANC may be less available in the public sector and more costly to receive in the private sector than delivery care in Iraq. This is also because primary healthcare services are unequally distributed, understaffed and

insufficiently resourced in Iraq (Ministry of Health Iraq, 2014; Schweitzer, 2017). When women have limited access and options, delivery care could be the minimum care needed to save lives; thus, ANC could be additional and less prioritised, as seen in other low- and middle-income countries (Walker et al., 2013). Although antibiotics for ARI treatment and modern contraceptive methods are mainly available in the private sector, the supply and quality of such medications are generally insufficient and/or poor in Iraq (Central Organization for
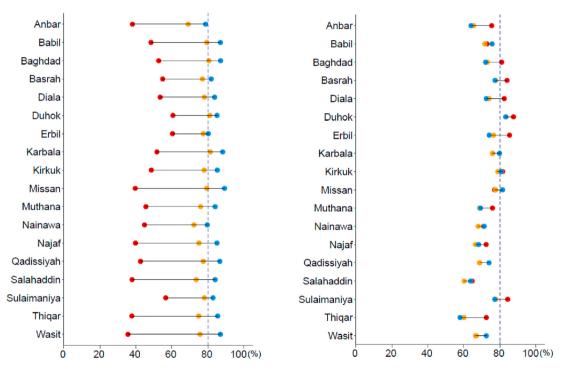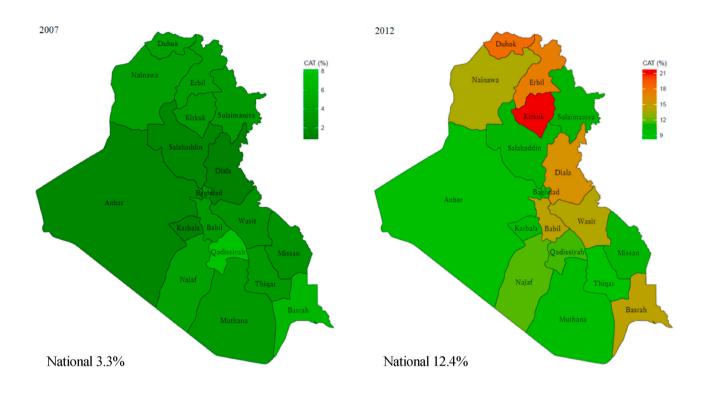
Fig. 2. Subnational-level childhood immunisation indicators in Iraq, 2000–2030.

Statistics & Information Technology; Kurdistan Regional Statistics Office; UNICEF, 2019; Shabila et al., 2012). The negative perception and high cost of these medications may prevent those with limited means from seeking treatment or may bring financial risk to those who do. On the other hand, this study found continuous improvement of oral rehydration therapy coverage. This might be due to home-made therapy and the wide availability of oral rehydration salts and zinc in the public sector.

The study found worsened financial risk protection indicators, including a fourfold increase in catastrophic health expenditure from 3% in 2007 to 12% in 2012 and a twofold increase in impoverishment from 1.5% in 2007 to 2.8% in 2012. These findings are consistent with neighbouring countries including Afghanistan (catastrophic health expenditure: 4.8% in 2007, 14.6% in 2013; impoverishment: 1.8% in

A. Catastrophic health expenditure

National 3.3%   National 12.4%

B. Impoverishment
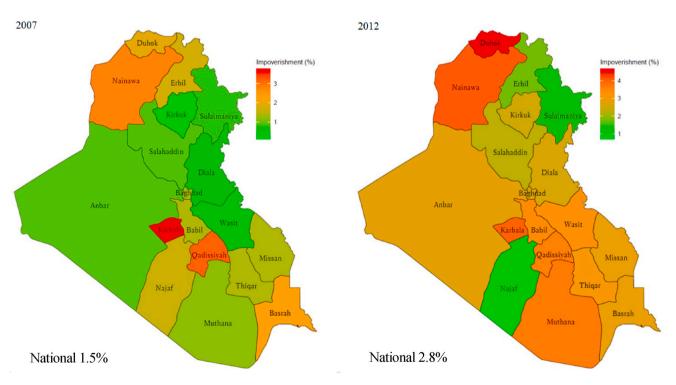

National 1.5%   National 2.8%

Fig. 3. Subnational-level financial risk protection indicators in Iraq, 2007 and 2012. CAT, catastrophic health expenditure.

2007, 3.1% in 2013) and Yemen (15.4% in 2005, 15.8% in 2014; 4.2% in 2005, 4.3% in 2014, respectively) (World Health Organisation, 2019a).

While GDP and GDP per capita in Iraq increased from 2004 to 2013, the share of OOP in current health expenditure (CHE) also sharply increased from 2004 to 2016 ((The World Bank and OECD, 2019); World Health Organisation, 2017). The failure of reconstruction in 2007–2011 brought unequal distribution of benefits, increased financial risks across the country, and disparities in financial risk protection among governorates (Matsunaga, 2019). In fact, the largest increases in catastrophic health expenditure in 2012 occurred in oil-rich areas including Duhok, Erbil, Kirkuk, Diala, Babil, Wasit, and Basrah. The private health sector is more concentrated in populated areas where there are more people who have some means to pay; therefore, those populations might be more exposed to catastrophic health expenditure. Nevertheless, populations in other areas should also be prioritised, as they may not seek necessary care due to inability to pay.

Moreover, Iraq's GDP spending on health, 4.2% in 2017, was still low in contrast to other countries including Afghanistan (11.0%), Iran (8.9%), Georgia (8.4%), Uganda (6.3%), and Turkey (4.3%) (World Health Organisation, 2019b). Previous studies showed that UHC indicators were significantly positively associated with GDP per capita, and that most UHC indicators were correlated with the share of health spending through social health insurance and government schemes (Wagstaff et al., 2018; Wagstaff and Neelsen, 2020). Iraq MoH envisioned implementing risk-pooling and health financing mechanisms such as social insurance, prepaid options, and sin-tax in the National Health Policy in 2014. Georgia and Iran are two of the countries that have similarly suffered from long-term conflicts and instabilities and their households similarly experienced financial risks. Both countries were able to increase healthcare access and reduce financial burdens through reforming and strengthening their health systems. For example, increased benefit packages were put forth to low income households in Georgia, while a sin tax was implemented in Iran in an effort to prioritize public health expenditure and increase fiscal space for health (Erica Richardson, 2017; Sajadi et al., 2019). When Iraq transitions to a post-conflict period, it could be time to put their envisioned policies back on track.

This study has several strengths. This is the first study to assess trends and projections of health service coverage and financial risk protection indicators in Iraq at the national and subnational levels. Second, this study made the most of a large number of population-based household health and expenditure survey data. Third, this study applied population movement of IDPs and population density in each governorate to the estimates. Finally, this study developed Bayesian hierarchical regression models to estimate the trend and projection analysis. However, this study also has several limitations. All of the results in this study were based on present trends and estimations where adjusted or additional policies and interventions will not be introduced. Due to scarce data, this study was not able to make projections for postnatal care, family planning needs (governorate-level), the management of other communicable and non-communicable diseases, service capacity and access, and financial risk protection indicators.

5. Conclusion

Despite successive conflicts and political turmoil, the overall coverage of health service indicators has increased in Iraq. However, without proactive strengthening of the healthcare system, only five health service coverage indicators will achieve UHC targets by 2030. Family planning needs satisfied, ANC4, DTP3 and measles immunisations, ARI treatment, oral rehydration therapy, and two financial risk protection indicators face serious challenges in achieving the target. Worsened trends in health service coverage and financial risk protection are observed in conflict-affected and underdeveloped areas. Even in the oil-rich areas, populations are suffering from increasing financial risk. In addition to the stable expansion of EPHS, it is critical to improve inequitably distributed and under-resourced public health centres, regulate public-private role allotment, and strengthen domestic health financing and risk pooling mechanisms in order to achieve the UHC targets with less disparities among governorates.

CRediT author statement

Hiroko Taniguchi: Conceptualisation, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft preparation & editing. Md Mizanur Rahman: Conceptualisation, Methodology, Formal analysis, Validation, Writing – review & editing, Supervision. Khin Thet Swe: Formal analysis, Validation, Writing – review & editing. Ashraf Hussain: Writing – review & editing. Kenji Shibuya: Writing – review & editing, Supervision. Masahiro Hashizume: Writing – review & editing, Supervision

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned (and, if relevant, registered) have been explained.

Declaration of competing interest

We declare no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2020.113630.

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Availability of data and materials

All individual level data are available from UNICEF Multiple Indicator Cluster Survey (MICS) website (https://mics.unicef.org/surveys). Household data are available from The World Bank Household Socio-Economic Survey (HSES) website (https://microdata.worldbank.

org/index.php/catalog/lsms). Therefore, interested researchers could access all data from the websites.

All data generated or analysed during this study are included in this published article and its supplementary information files. Study protocol and statistical code are available from the corresponding author.

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