

GENDER-SENSITIVE RESPONSE TO CRISES USING CRVS: A PUNJAB CASE STUDY



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Disclaimer

The data used in this paper are confidential and are the sole property of the Government of Punjab. The data have been used for analytical purposes only. UN Women and UNFPA have not been given access to the microdata; rather, aggregates have been calculated by the author under UN Women's guidance. As a result,

UN Women and UNFPA have limited scope for assessing the accuracy of the calculations; this responsibility rests with the lead author. The views expressed in this publication are those of the lead author and do not necessarily represent the views of UN Women, the United Nations or any of its affiliated organizations.

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Acronyms and abbreviations

CoD	cause of death
COVID-19	2019 novel coronavirus
CNIC	computerized national identity card
CRVS	civil registration and vital statistics
DHIS	District Health Information System
FP	family planning
LHW	Lady Health Worker
ICD	International Classification of Diseases
NADRA	National Database and Registration Authority
NCOC	National Command and Control Centre
PDHS	Pakistan Demographic and Health Survey
PITB	Punjab Information Technology Board
PSPU	Policy and Strategic Planning Unit
SARS	severe acute respiratory syndrome
SDG	Sustainable Development Goal
TSU	Technical Support Unit
UN ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFPA	United Nations Population Fund
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women

EXECUTIVE SUMMARY

Civil registration and vital statistics (CRVS) systems provide essential information on the population of a country, including on births, deaths and marriages, among other life events. These systems have the potential to play a fundamental role in socio-economic planning and monitoring in general and in health crises in particular. CRVS can inform a broad range of interventions in diverse policy domains.

Despite their critical role, CRVS systems are not fully developed in all low- and middle-income countries.¹ This lack of comprehensive and accurate CRVS has been highlighted by the COVID-19 crisis, as countries with weak death registration systems could not accurately register all deaths and their causes or analyse national mortality statistics in a timely manner.² Furthermore, since women's and girls vital events, are under-registered in many CRVS systems,³ analyses through a gender lens were especially challenging.

To illustrate some of the challenges and opportunities associated with using CRVS in times of crisis, this paper analyses data for Pakistan's Punjab province, a region with more comprehensive death registration systems than the national average (while in Pakistan an estimated 42 per cent of deaths among children under 5 are registered,⁴ in Punjab this figure rises to

75 per cent⁵). Registration of cause of death (CoD), however, remains low, as only a few leading private hospitals document this consistently.⁶ CoD data were largely unavailable in Punjab's public sector hospitals until 2019, when a system for digital recording of medically certified CoD was introduced⁷ across select secondary and tertiary care⁸ public hospitals.

In light of COVID-19, the existing CRVS system in Punjab proved insufficient to provide COVID-19-related mortality updates. In response, the government of Punjab introduced a COVID-19 dashboard; an extension of the CoD system that includes suspected, diagnosed and confirmed cases; related mortality and personal details for contact tracing. Non-COVID-19-related deaths continue to be recorded by the standard existing CoD system.⁹

During the first wave of COVID-19, from February to September 2020, the District Health Information System (DHIS), which records manually compiled death statistics,¹⁰ reported 23,552 deaths¹¹. During the same reference period, the digital CoD system recorded 10,943 deaths, with the medically certified cause recorded for 46 per cent.¹² Of the digitally recorded deaths, 1,898 (17 per cent) were reported as deaths due to COVID-19 while 9,045 (83 per cent) were attributed to other

1 UN ESCAP 2020a.

2 AbouZahr et al. 2020.

3 AbouZahr and Thomas 2020.

4 NIPS and ICF 2019, Table 2.11

5 BOS Punjab 2018.

6 Mursalin and Asharaf 2020.

7 This is a digitized system whereby all necessary information is entered in a shared system. A printed copy of the certificate is provided to the deceased's relatives and a copy of the same is placed in the patient's file for record keeping. Although the system was introduced in 2018, in practice consistent recording did not begin until 2019.

8 Secondary care hospitals are those located at district level and serve an average population of 1 to 3 million, while tertiary care hospitals provide specialized health care through specialized staff and equipment.

9 In practice, this meant that the original CoD system did not record any COVID-19-related deaths, with the exception of the first few, as these were recorded in the extension system.

10 These are entered electronically in the system by statistical officers at the end of each month.

11 DHIS death records do not necessarily include information on age, sex or causes of death.

12 10,943 deaths out of 23,552 deaths reported in the DHIS. Although some of these may have been fed into the DHIS count, it remains difficult to ascertain how many. Recording of deaths taking place in hospitals does not include all necessary indicators to match them with deaths recorded under the local civil registration system, so it is difficult to assess the share of these deaths that were fed into the DHIS system.

causes. These data highlight important recording gaps, as they demonstrate that less than half of all deaths are currently being reported with an precise CoD through hospital death record systems in Punjab. However, the available information also points to the advantages of a comprehensive CRVS system, such as identifying the proportion of overall deaths attributed to COVID-19.

Sex-disaggregated data analysis indicates that more male deaths (71 per cent of COVID-19 deaths) than female deaths due to COVID-19 were recorded in the CoD extension system. Although global mortality data indicates that overall more men may be dying as a result of the pandemic, the large gender gap in Punjab is well above the world's average and likely compounded by under-registration of female deaths. The paper examines potential reasons behind this issue, along with their effect on the management of the COVID-19 crisis. In addition, the pandemic's effect on women is evidenced by other forms of data, beyond vital statistics, found within the DHIS: a sharp decline in antenatal first visits and revisits to the hospital, in

registration of pregnant women with Lady Health Workers (LHW) and in users of modern contraceptives.¹³ All of these indicators are associated with related increases in complications during delivery and may be contributing to potential increases in female mortality.¹⁴ Data analysis is also used throughout the paper to evidence this.

The policies implemented for the management of COVID-19 in Punjab—ranging from testing, contact tracing, treatment of patients and standard operating plans following the deployment of human resources to hospitals—have been mostly gender blind. For instance, resources were distributed based on the overall COVID-19 burden, irrespective of the sex of the patient or health care professional¹⁵. This may be due partly to the limited availability of sex-disaggregated vital statistics. It highlights the need to fill gaps in existing vital statistics recording systems in order to generate sex-disaggregated estimates that could inform the management of future pandemics as well as gender-sensitive policy responses.

13 Refers to the first wave in Pakistan.

14 According to the WHO, antenatal care reduces maternal and perinatal morbidity and mortality both directly, through detection and treatment of pregnancy-related complications, and indirectly, through the identification of women and girls at increased risk of developing complications during labour and delivery, thus ensuring referral to an appropriate level of care. See: WHO 2016a.

15 This includes, but is not limited to, sizes of masks and globes suitable for male/female hands and faces, medication with different levels of efficacy between males and females, female hygiene products, etc.

INTRODUCTION

COVID-19 has impacted the lives of women and men across multiple dimensions well beyond health and illness.¹⁶ While data suggest that the pandemic's effect on women's physical health has been milder than on men's,¹⁷ the impact on women will not be fully understood where they are undercounted. More women may be catching and even dying from COVID-19 than the numbers recorded.¹⁸ Existing data indicate that, while COVID-19 has affected everyone, vulnerable population groups, including women of rural, poor and ethnic minority backgrounds, have paid the heaviest price.¹⁹

A resilient, universal and comprehensive civil registration and vital statistics (CRVS) system can, along with housing and population censuses and household surveys, collect demographic data on population dynamics, health and inequities in service delivery.²⁰ As such, by providing up to date demographic data, CRVS systems can support access to public services.

In countries where CRVS systems are not fully developed, the under-registration of the vital events of some population groups, such as women, is frequent.²¹ Though variations exist, people with higher socio-economic status living in urban areas have better chances of having their vital events registered, partly due to their physical proximity and access to

registration systems, while lack of registration offices or economic limitations often hamper registration in rural areas.²² In the case of women and girls, barriers to registration may include: fees and penalties associated with registration and late registration of births, particularly in settings with son preference, as well as deaths; limited knowledge among parents about the importance of registration; lack of incentives to register female life events such as deaths and marriages, especially where women own fewer assets to pass on to family members; local regulations placing primary responsibility for registration on male relatives; and stigma associated with the registration of certain causes of death (such as deaths related to violence and certain diseases).²³

During crises the quality of CRVS may be compromised²⁴ due, for instance, to closure of registration offices and lack of access to registration desks because of disruptions in transportation or fear of travelling. Without a resilient and comprehensive CRVS system, it is difficult to assess the true burden of a pandemic such as COVID-19 on different population groups in a timely manner. It is therefore critical to comprehensively register and analyse life events, and accurately record causes of death, as well as disaggregate vital statistics by age, sex and other socio-demographic characteristics in order to respond to crises effectively.²⁵

16 World Bank 2020.

17 Bhopal and Bhopal 2020; Peckham et al. 2020.

18 Dehingia and Raj 2021; UN ESCAP 2020b..

19 Global Health 5050 undated.

20 WHO 2015.

21 AbouZahr and Thomas 2020.

22 UNICEF 2020.

23 Open Data Watch 2021.

24 AbouZahr et al. 2020; APAI-CRVS undated.

25 Bauchner and Fontanarosa 2020.

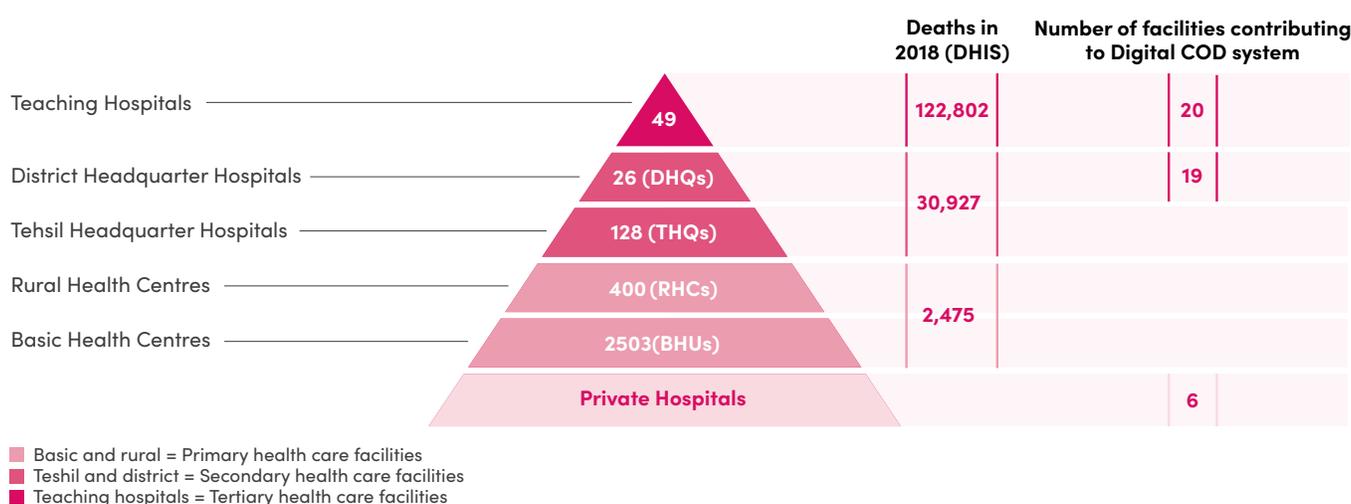
OBJECTIVES, METHODOLOGY, DATA QUALITY AND LIMITATIONS

Geographical scope and objectives

Pakistan, one of the most populous countries in the world, is still in the process of developing and structuring its fragmented CRVS system. In this regard, the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) and many other members of the UN family have worked with the Government for over a decade to strengthen CRVS in the country. This paper illustrates some of the existing challenges and opportunities in the area of CRVS, and particularly death-related registry data, through analysis of such data in Pakistan's Punjab province.

As per the latest available housing and population census (2017), the total population of Punjab is 110 million. There are 3,106 public health facilities serving the population across its 36 districts. Based on the types of health services provided, these are classified across three tiers: 2,903 primary care health facilities (basic health and rural health centres),²⁶ 154 secondary care health facilities (Tehsil or Taluka and District headquarters hospitals)²⁷ and 49 tertiary care health facilities (Teaching hospitals attached to medical colleges),²⁸ as represented in Figure 1. The data used in this study pertains to facilities across all 36 districts.

Figure 1: The three-tier health infrastructure in Punjab and their recorded deaths in 2018



26 Primary and Secondary Healthcare Department 2020.

27 ibid

28 Specialized Healthcare and Medical Education Department 2018.

A digitized registration system has been put in place in Punjab, that currently records hospital deaths and causes of death as per international standards. This system is commonly referred to as the cause of death (CoD) registration system. The system is also expected to start digitizing hospital births in the coming year, and the data recorded is expected to be integrated into provincial and national databases. The data on numbers and cause of death recorded through the CoD system has been used throughout this paper to assess the importance of comprehensive and accurate registration for responding to the COVID-19 pandemic.

The research objectives in this paper include:

- Identifying challenges associated with death registration, and particularly CoD registration, from a gender perspective;
- Illustrating the consequences of under-registration of women's and girls' deaths and misclassification of the causes of these deaths;
- Identifying and providing recommendations for improvement of the CRVS system in Punjab, particularly for registering everyone's CoD accurately and comprehensively.

Methodology

A two-step process was undertaken to complete this research:

1. A desk review of secondary sources, including existing literature on utilizing CRVS for a gender-sensitive response to the COVID-19 crisis, as well as existing manuals, forms, procedures and

documents for birth and death registration found throughout various civil registration offices²⁹ in Punjab, including local union councils, cantonment offices and the National Database and Registration Authority (NADRA).

2. Analysis of primary registry data from official archives of the Punjab Information Technology Board, Health Department and Local Government and Community Development Department of the government of Punjab.

Sources of data

Data utilized for this paper have been sourced from the following locations:

- **CoD dashboard:** Utilizing International Classification of Diseases (ICD)-10 coding,³⁰ Punjab records mortality data from public hospitals and reports it in a CoD digital dashboard. For this study, only deaths taking place from February to September 2020, the first wave of COVID-19 in Punjab, have been considered. Currently, the CoD dashboard is operative in 19 district headquarter hospitals (including one teaching district headquarter hospital) and 20 tertiary care public hospitals (including 11 teaching hospitals and 9 specialty care hospitals, of which 2 are children's hospitals). The dashboard is not yet implemented in disease-specific hospitals such as urology/dental/ mental/ TB/obstetric care or burn units, etc. Though 19 of the 49 teaching hospitals are located in Lahore, the CoD system covers major hospitals across all regions of Punjab (see Table 1). In addition, the system also captures deaths recorded in six leading private hospitals. The CoD dashboard does not include COVID-19-related deaths.

29 Although the data utilized in this paper do not formally belong to Pakistan's Civil Registration system, they pertain to death registration and are expected to soon become part of the National Database and Registration Authority (NADRA).

30 The International Classification of Diseases is a global standard/list for causes of death for documenting health data digitally. Specific codes are assigned to the diseases for health information and evidence-based decision-making. Its 10th edition is being used in more than 150 countries. ICD10Data.com 2021 was used to form a subset of 10,000 diseases prevalent in Pakistan. The international codes have been assigned, and local names of the diseases have been added in the system.

Table 1: Geographical detail of public hospitals reporting data to the digital COD system in Punjab, Feb–Sept 2020

Region	Tertiary care hospitals						Secondary care hospitals		
	Specialty care hospital			Teaching hospital			District HQ hospital		
	Total	Digital CoD reporting	%	Total	Digital CoD reporting	%	Total	Digital CoD reporting	%
Central Punjab	10	5	50%	22	6	27%	10	5	50%
Northern Punjab	3	2	67%	4	3	75%	8	8	100%
South Punjab	4	2	50%	6	2	33%	8	6	75%
Total	17	9		32	11		26	19	

- COVID-19 dashboard:** COVID-19–related deaths are recorded in a separate COVID-19 dashboard established by the government of Punjab. This includes additional information on probable/suspected, diagnosed and confirmed patients. COVID-19–related morbidity and mortality data from February to September 2020 were considered for this paper.
- Punjab’s District Health Information System (DHIS):** Launched across all of Punjab’s districts by 2007, the DHIS records key routine health information from public health facilities, including information on numbers of deaths and many other health indicators.³¹ Death-related data are manually gathered from hospital death registers on a monthly basis. However, the information recorded is mostly limited to total number of deaths and fails to consistently record additional socio-demographic characteristics such as sex, age and occupation of the deceased. Cause of death is also not consistently recorded. Data from 2016 to September 2020, was considered for this paper. To enhance comparability with the CoD data, only entries from health facilities where the CoD system also operates have been considered.

In all instances, the microdata from dashboards were exported into Excel and anonymized prior to further analysis.

It is important to note that, to capture community-level deaths such as those taking place outside health

facilities, Punjab’s Health Department has deployed around 45,000 Lady Health Workers (LHWs) to record births and maternal deaths at the community level. These are recorded through a separate system—the LHW-Management Information System—and are not included in this study.³² Therefore, a key limitation of this study is that it fails to consider deaths taking place outside health care facilities, a substantial proportion of all deaths in Pakistan.

Quality of data

To ensure the quality, completeness and accuracy of the provincial data, mortality data in the Punjab COVID-19 dashboard were compared with national statistics from the National Command and Operation Centre (NCOC) managed by the Ministry of National Health and Regulation. The NCOC is the central body that regularly compiles COVID-19–related death statistics received from provincial health departments. Prior to publication, the NCOC deploys teams to the field to conduct verification checks, including by contacting families of the deceased. If inconsistencies are identified, the NCOC adjusts the statistics. After comparison, no significant differences were found for COVID-19 mortality statistics in Punjab. For DHIS statistics that required comparisons with manual birth and death registers of health facilities, the quality of the data could not be assessed.

31 WHO Regional Office for Eastern Mediterranean 2019.

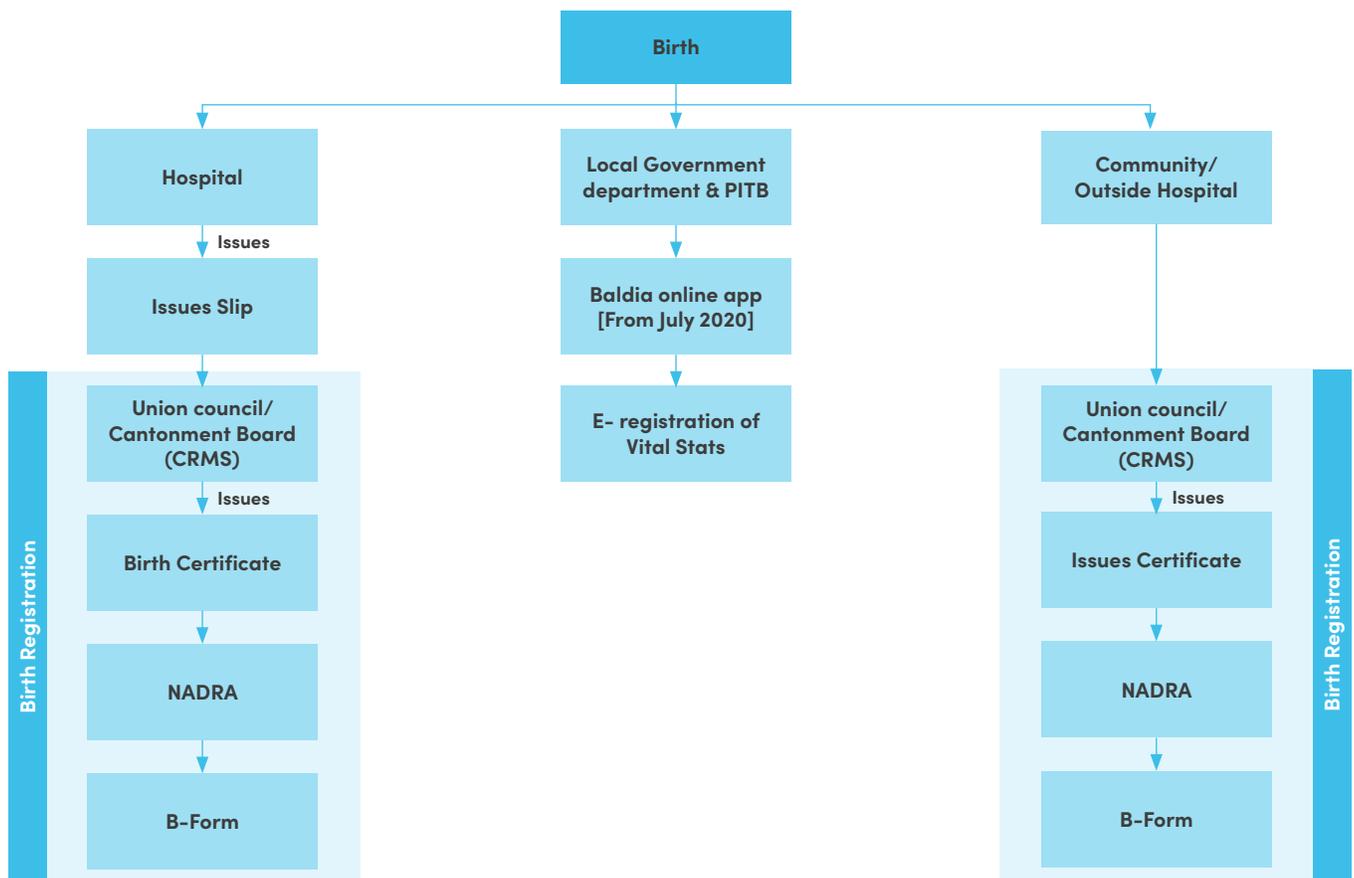
32 An exception is Table 7.

THE CIVIL REGISTRATION SYSTEM IN PAKISTAN

In 2010, the Government established the National Database and Registration Authority (NADRA) as the central body for registration of vital events, including births, marriages and deaths, through dedicated offices. Despite being centrally responsible for registration, NADRA issues only Bay forms (B forms)

(child registration forms), instead of birth registration certificates, which remain the responsibility of Local Union Councils (see Figure 2). Issuance of computerized national identification cards (CNICs), which are required for registration of all essential civil and vital events, is the sole responsibility of NADRA.³³

Figure 2: The birth registration process in Punjab



33 The National Database and Registration Authority Ordinance 2000.

In 2014, Pakistan endorsed the “Regional Action Framework for Civil Registration and Vital Statistics in Asia and the Pacific” in Bangkok, Thailand. Since then, CRVS has gained significant momentum in the country, but the country’s weak, fragmented and

compartmentalized CRVS system is a key challenge to strengthening record-keeping. Evidence from NADRA and local union councils indicates that as few as 42 per cent of children under 5 years of age had their births registered as of 2017–2018 (Table 2).

Table 2: Proportion of registered births and people with registration certificates in Pakistan, 2012 to 2018 (percentage)

Registration-related indicator	2012–13³⁴ %	2017–18³⁵ %
Proportion of children under 5 whose births were registered (with NADRA or local union councils)	34	42
Proportion of children under 5 whose births were registered, lowest wealth quintile households	5	9
Proportion of children under 5 whose births were registered, highest wealth quintile households	71	76
Proportion of children under 5 with birth certificates (local union councils)	32	36
Proportion of adults (ages 18 and over) with a CNIC	83	84

Source: NIPS and ICF 2012, 2019.

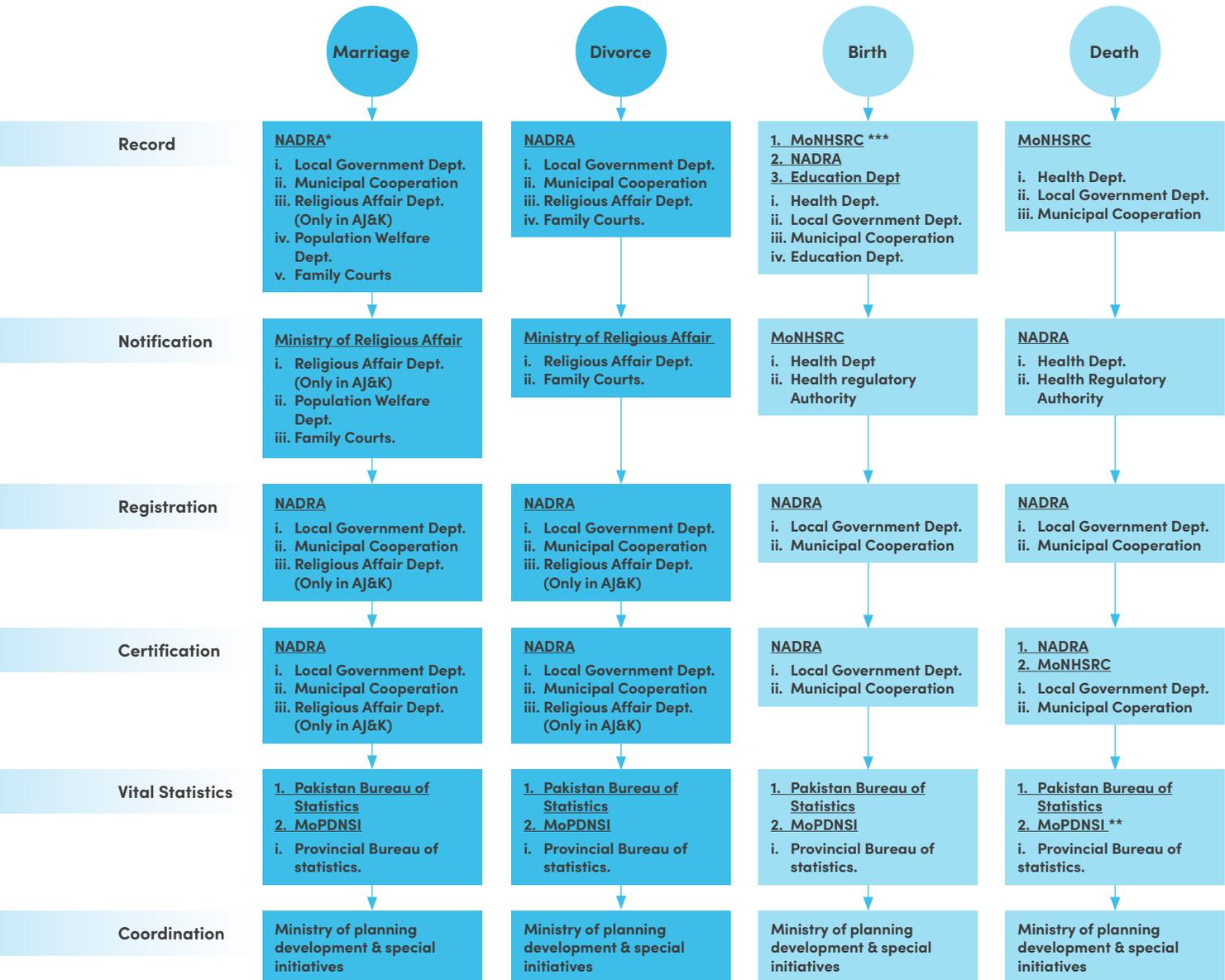
After the 18th amendment to the Constitution in 2010 and related decentralization, the number of stakeholders to the CRVS system increased. Multiple systems are in place

at provincial level to produce various vital statistics, but accurate mortality statistics, along with data on cause of death, remain a key gap.

34 These figures do not include the territories of Azad Jammu and Kashmir and the former Federally Administered Tribal Areas.

35 These figures do not include the territories of Azad Jammu and Kashmir and Gilgit-Baltistan.

Figure 3: CRVS stakeholders in Pakistan



Note: Key organisms for registration and reporting of vital statistics have been underlined.

*National Database and Registration Authority

**Ministry of Planning, Development & Special Initiatives

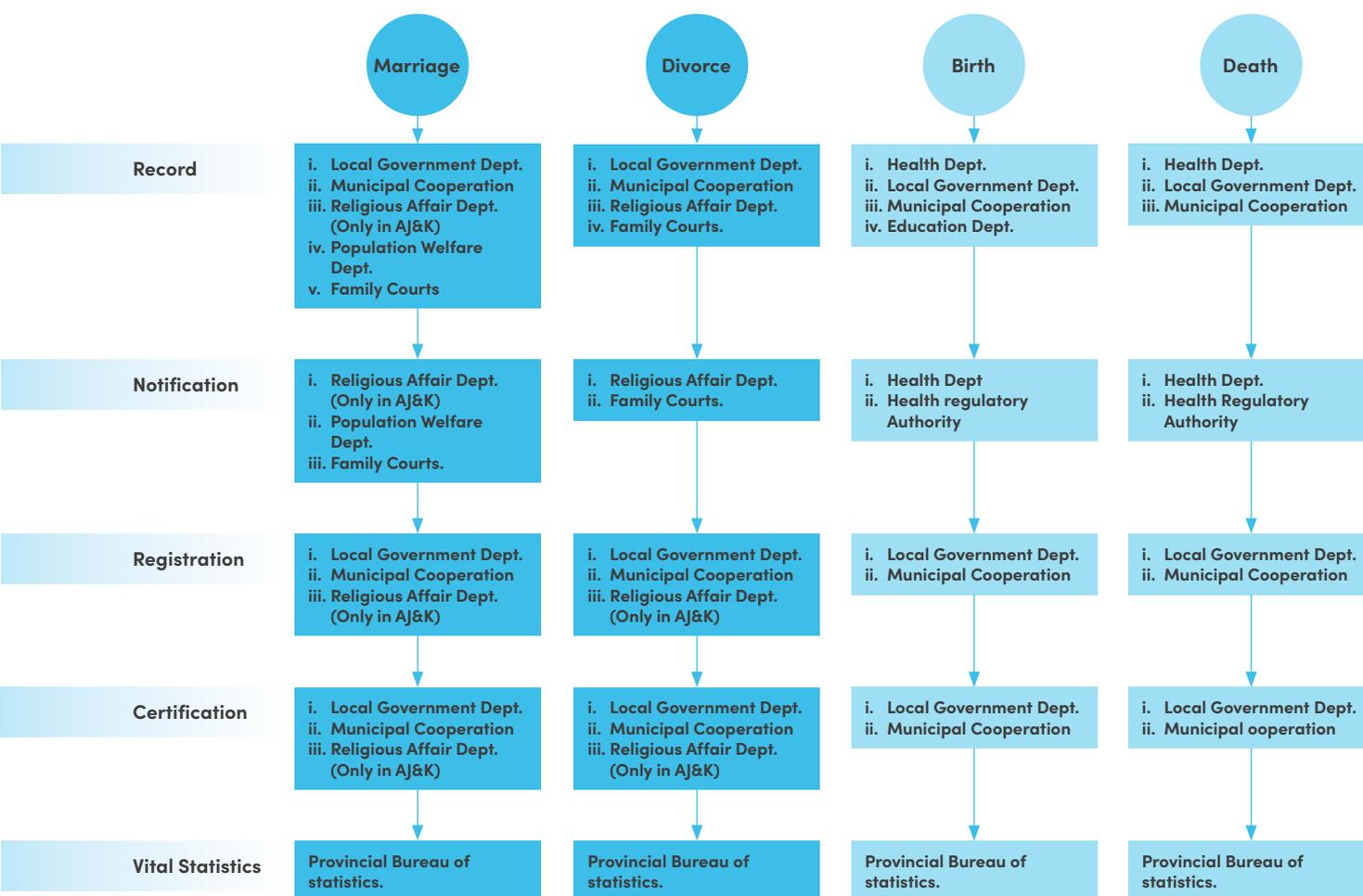
***Ministry of national health services regulation and coordination

The Technical Support Unit (TSU)-CRVS, within the Ministry of Planning, Development and Special Initiatives, was created in October 2017 to standardize a national civil registration system across Pakistan.³⁶ However, due to vast provincial variation in the infrastructure and

operation of civil registration offices, no centralized system of CRVS has yet been established. Under TSU-CRVS's stewardship, each province is making individual efforts to coordinate all the institutions responsible for recording vital events.

36 Civil Registration and Vital Statistics 2021.

Figure 4: CRVS stakeholders in Punjab



Civil registration system in Punjab province

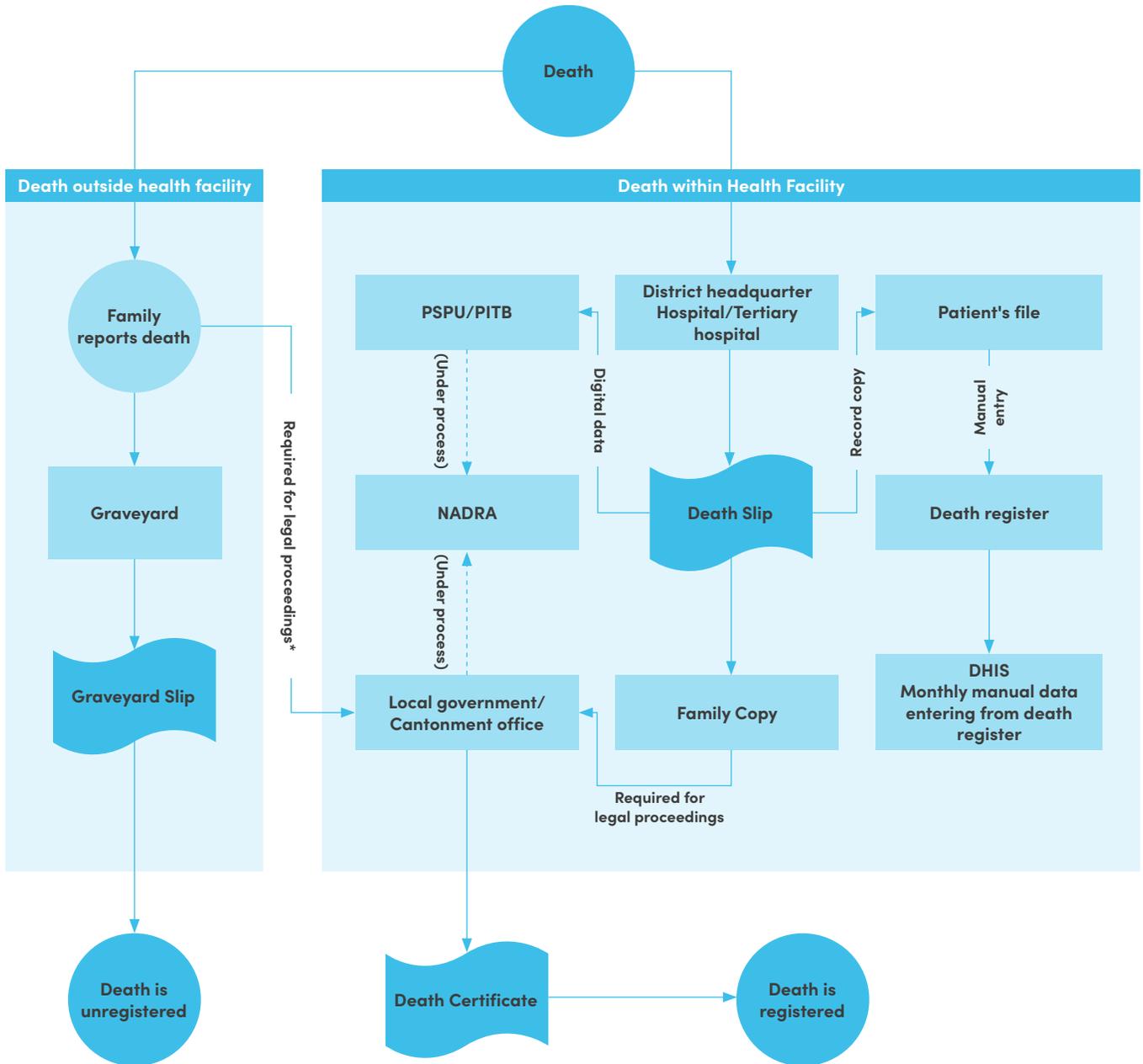
Multiple stakeholders—including the Health Department, Local Government Department, cantonment boards, Social Security Department, Auqaf and Religious Affairs Department and the National Database and Registration Authority—are involved in reporting, recording and registering various vital events in Punjab (Figure 4).

Most stakeholders operate in silos, and overall coordination is lacking. At present, digital recording

of deaths in hospitals is coordinated by the Punjab Information Technology Board (PITB) and the Policy and Strategic Planning Unit (PSPU) of the Health Department of Punjab. Efforts are underway to integrate these records into NADRA.³⁷ Links with local union council registers are also in the process of being established, which would be critical to ensure deaths taking place outside health facilities are considered and incorporated into the national registry (currently, none of these are registered unless this is needed for legal proceedings). Graveyard slips are issued by the staff/gravedigger in all areas except cantonment areas, where cantonment boards issue burial certificates.

³⁷ This process is envisaged as a one-way integration process, whereby provincial records are reported to NADRA but records from NADRA are not fed back into provincial registries. However, it is expected that NADRA will entertain specific requests from PSPU to get access to its data when required.

Figure 5: Mapping of the death registration process in Punjab



*Many deaths taking place outside health facilities, particularly maternal deaths, are reported as a result of the work carried out by Lady Health Workers.

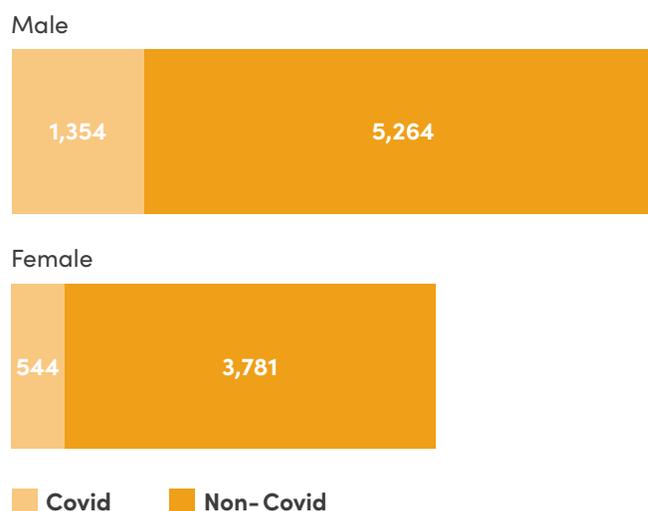
DEATH REGISTRATION IN PUNJAB DURING THE COVID-19 PANDEMIC: KEY GAPS AND CHALLENGES

The CoD system, based on hospital death records, provides details about patient's primary, secondary³⁸ and underlying causes of death utilizing ICD-10 coding. However, in order to halt the spread of COVID-19, additional information, such as socio-demographic data, contact details and travel history of the patient has proved essential for contact tracing.

As outlined in section 2.3, in April 2020 the government of Punjab introduced a COVID-19 dashboard for recording deaths of COVID-19 patients only. The COVID-19 and CoD dashboards are complementary: All deaths other than those that are COVID-19-related are recorded through the CoD system, while only COVID-19 patient data are included in the COVID-19 dashboard. Comparing these figures with those of the DHIS provides a rough indication of the thoroughness of registration of deaths by cause, although none of the sources is fully comprehensive. Compared to 23,552 deaths reported in the DHIS, only 10,943 deaths (46 per cent) were recorded in the digital CoD and COVID-19 dashboards between February and September 2020.³⁹

Of these, 1,898 deaths (17 per cent) were reported as connected with COVID-19 while 9,045 patients (83 per cent) were due to other causes (Figure 6).

Figure 6: Total deaths recorded through Punjab's CoD system and COVID-19 dashboard, February to September 2020, by cause



38 Conditions that augment the likelihood of death and aggravate the leading condition recorded as primary cause of death are considered secondary causes.

39 This comparison considers only health facilities where both the CoD and DHIS systems were functional. All births recorded in the digital CoD system were also recorded under DHIS.

According to these data, 29 per cent of the COVID-19-related deaths recorded were female, compared to 42 per cent of the non-COVID-19-related deaths. Although globally more men than women are estimated to be dying from the virus, the gender gap observed in Punjab greatly exceeds the global ratio. Globally, for every 10 female COVID-19 deaths there are 13 male deaths.⁴⁰ In Punjab, available data indicate that for every 10 female COVID-19 deaths there are almost 25 male deaths. Although insufficient information is available to validate the accuracy of this statistic (e.g., whether the gender gap is indeed this large), a number of factors may be helpful in explaining the gap, including:

1. **More men than women may be accessing professional care:** Despite notable improvements over the past decades, many women in Pakistan remain unable to access care from health professionals. An indication of this is that only 69 per cent of births were attended by health professionals in 2018.⁴¹ In addition, an estimated 67 per cent of women reported major problems accessing treatment for themselves when they are sick (including lack of knowledge on where to find help or the need to get permission from their partners).⁴² Furthermore, as a result of national and provincial lockdowns, intercity and intracity transportation was closed during the first wave of COVID-19. All of these factors may deter women from going to a hospital when sick, which makes it less likely for their deaths to be registered through health facilities.
2. **Recording deaths may be complicated when women lack legal identity:** In Pakistan, women are significantly less likely than men to have legal identity, as evidenced by their disproportionate disadvantage in accessing computerized national identity cards (CNIC): 76 per cent of females have one compared to 91 per cent of males.⁴³

This may pose problems at the time of death, as the lack of legal identity documents may prevent health-care providers from reporting it. In Punjab, possessing a CNIC is a mandatory requirement for registration of death with civil registration authorities.

3. **The cause of women's deaths may be inaccurately recorded:** COVID-19 has had important impacts on women's health. As women's life expectancy is longer than men's, they are more likely to suffer from multiple chronic conditions, such as hypertension and arthritis and (prior to the crisis) they were more likely than men to visit health professionals.⁴⁴ Evidence is plentiful on the disproportionate fragility of elderly populations to succumb to COVID-19, thus highlighting women's disproportionate risk. However, since the onset of the pandemic, fewer women are seeking help in health facilities, due to fear or to these facilities not providing routine health services. Failure to seek timely professional medical help may result in more at-home deaths and inaccurate registration of cause of death.
4. **Women's deaths are less likely to be reported overall:** Women, overall, tend to own fewer assets than men, and thus the incentive to register their deaths may be lower in the absence of inheritance. In addition, social norms contribute to under-registration of some kinds of female deaths. An estimated 48 per cent of pregnancies in Pakistan in 2012 were unintended, of which 54 per cent were terminated, mostly through unsafe abortions, which may cause health complications or death.⁴⁵ In addition, as many as 28 per cent of women experience violence and almost 6 per cent of them experience severe violence from an intimate partner.⁴⁶ Abortion and, violence survivors lodging in shelters may be have a disproportionate risk of contracting COVID-19 if the facilities are crowded.

40 Global Health 5050 2021.

41 UNSD 2021.

42 USAID undated.

43 NIPS and ICF 2019.

44 UNICEF 2021.

45 Guttmacher Institute 2015.

46 DHS 2018, calculations by UN Women.

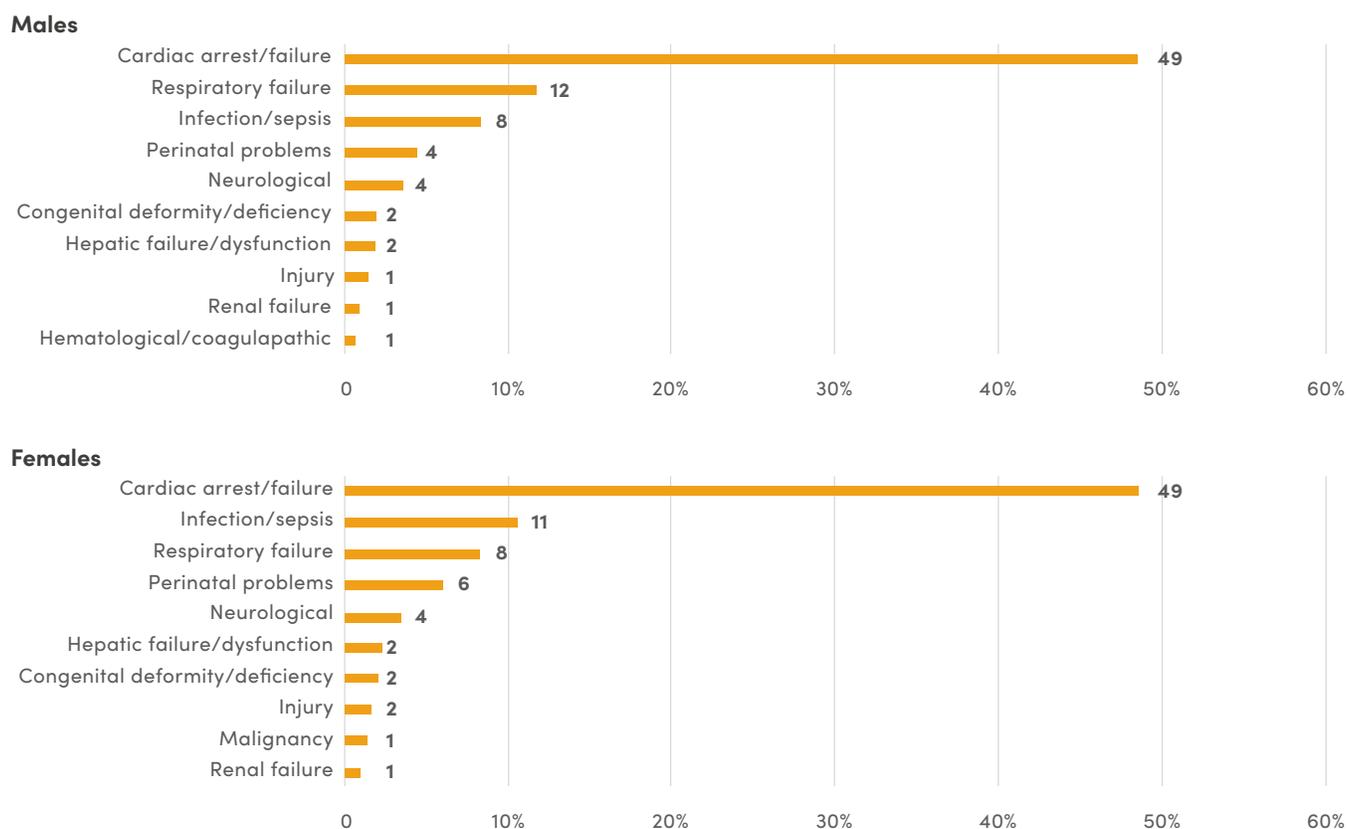
However, their COVID-19 related deaths are less likely to be recorded, as many survivors of violence and abortions may be reluctant to visit a health-care facility due to stigma, discriminatory social norms and shame.

In Punjab, registry data may provide some pointers around misclassification of cause of death, which may partially contribute to the large gender gap. CoD data on non-COVID-19-related deaths indicates that the top two causes of death for males in 2020 were cardiac arrest (49 per cent) and respiratory failure (12 per cent) (see Figure 7). A similar share of women's registered deaths also pertained to cardiac arrest (49 per cent), while 8 per cent pertained to respiratory failure. As evidence shows that the virus increases the risk of both cardiovascular disease and respiratory failure,⁴⁷ it is

possible that some of these deaths were COVID-19-related but misclassified due to false-negative test results, discriminatory social norms or other reasons. Particularly at the beginning of the pandemic, it is likely that patients were either not tested for COVID-19 or died before test results were available, in which case their death may have been recorded as having a different cause.

In addition, pre-COVID-19 DHIS data indicate that, in 2018, the top cause of death in the province was, by far, chronic liver disease⁴⁸—while 2020 data only registered 2 per cent of deaths associated with hepatic failure. This may also be proof that under-registration and/or misclassification of some causes of death may be taking place, although due to the partiality of the existing data, further analysis is needed to ascertain this.

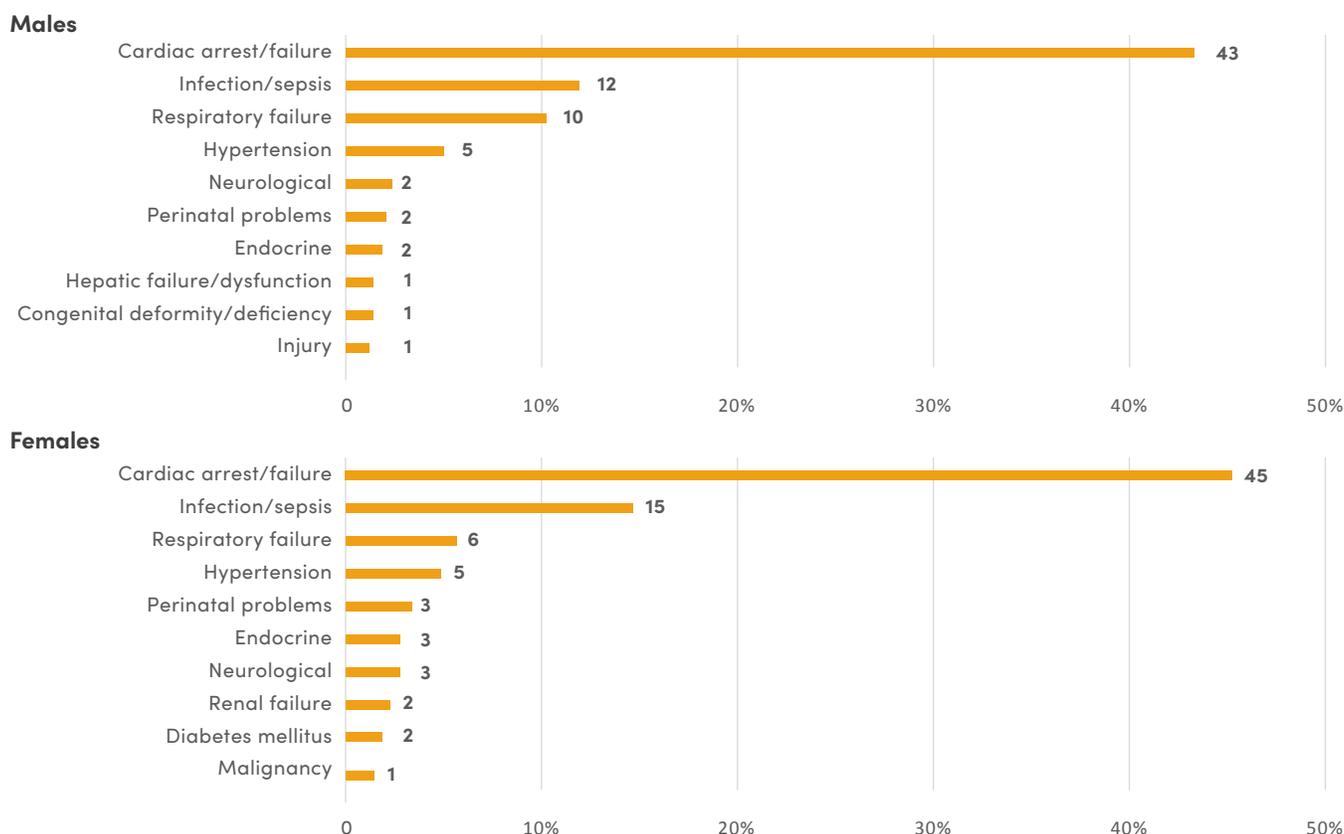
Figure 7: Proportion of total deaths registered under CoD associated with different immediate causes besides COVID-19, February to September 2020, by sex



47 Sultanian et al. 2021.

48 Khan 2020.

Figure 8: Proportion of total deaths registered under CoD associated with different underlying causes besides COVID-19, February to September 2020, by sex



Source: Author's elaboration using data from the digital CoD system in Punjab.

Further analysis of COVID-19-related registered deaths suggests that these were disproportionately concentrated in Central Punjab, where the region's largest cities are located—and likely where testing was

more available. Lahore, for example, reported 1,204 deaths. South Punjab, on the other hand, suffered the least with 293 deaths during the pandemic.

Table 3: Total number of registered deaths due to COVID-19 in Punjab, February to September 2020, by sex

Region	Total registered deaths, female	Total registered deaths, male	Total population	Percentage of registered deaths that are female
Central Punjab	347	857	50,316,057	28.8
Northern Punjab	122	279	24,952,795	30.4
South Punjab	75	218	34,743,590	25.6
Total	544	1354	110,012,442	28.7

Other individual characteristics, such as the severity of the disease, the patient's occupation and their socio-economic background variables, could have been critical to inform policy responses to the crisis. However, data on occupation, for instance, was only available for 139 patients (7 per cent of entries), while information on the severity of the disease at death was available for

794 (42 per cent of entries) (see Table 4). This highlights that the focus of health-care professionals registering deaths was largely on responding to the disease rather than identifying associated factors. It also highlights the importance on further investing in death registration systems, including within health facilities, to enhance the comprehensiveness and accuracy of the data compiled.

Table 4: Total number of registered deaths among patients with COVID-19 in Punjab from February to September 2020, by severity of the disease at the time of death

Severity of the disease at death				
Gender	Asymptomatic ⁴⁹	Mild	Moderate	Severe/critical
Female	122	120	72	230
Male	278	301	211	564
Total	400	421	283	794

⁴⁹ Asymptomatic patients either presented in the hospital with diseases other than COVID-19 or were screened for COVID-19 as a result of being a close contacts of the patient/relative/caregiver diagnosed with COVID-19

REGISTRATION OF OTHER GENDER INDICATORS: THE IMPORTANCE OF ADMINISTRATIVE DATA FOR CRISIS RESPONSE

Besides direct mortality for infected victims, COVID-19 indirectly affected other cause-specific mortality rates, such as maternal and child mortality. This may have been, to an extent, exacerbated by women's limited access to pre- and post-natal health care. To assess the scale of the pandemic's impact in this regard, DHIS data can be used to roughly compare actual reported occurrences with projected occurrences (see Table 5). The projections included in Table 5 are made by using observations from 2016 to 2019. To estimate the expected 2020 value, a linear regression model is used⁵⁰. The results are then used to generate values for 2020. To measure the differences between the 2020 observed values and the 2020 estimated values, the following formula is applied:⁵¹

$$\frac{2020_{\text{observed}} - 2020_{\text{expected}}}{2020_{\text{expected}}} * 100 = \left(\frac{2020_{\text{observed}}}{2020_{\text{expected}}} - 1 \right) * 100$$

The result is a percentage difference of the observed value to the predicted value, as shown in Table 5. A negative value indicates that the indicator was lower in

2020 than expected from past values, whereas a positive value means it was higher.

These findings showcase, among other issues, that fewer pregnant women may be going to hospitals for antenatal care visits and fewer of them may be delivering their babies in hospitals (32 per cent drop for first visits, 25 per cent drop for re-visits and 19 per cent drop for hospital deliveries, by comparing observed with projected values during this period). This may be associated with difficulties reaching health facilities due to pandemic-related mobility restrictions, suspension of routine medical services in hospitals (such as all outpatient), financial limitations or fear of contracting the disease. As many deliveries are assumed to be taking place outside health facilities, which are overwhelmed with COVID-19 patients, maternal mortality ratios are expected to increase due to the absence of skilled birth attendants and inability to handle obstetric cases with complications.⁵²

50 Although the observations for previous years appear to follow an exponential trend, the availability of only four datapoints prevents the calculation of exponential projections. In light of the available information, a linear regression model was used. As the model has some caveats, such as limitations to generate estimates at some prediction intervals, as well as its sensitivity to extreme values, the projections must be interpreted with caution.

51 Helmenstine 2020.

52 Maternal and infant mortality data in Punjab is recorded by a separate information system managed by Lady Health Workers (LHWs). Those data are not fully comparable and thus comparisons should be made with caution. These data have therefore not been included in this table but appear in Table 7 below.

Table 5: Women’s health indicators, hospital antenatal care and delivery, 2016 to 2020, including projected 2020 figures*

Year (Feb- Sep)	First antenatal care visits (ANC-1) in the hospitals	ANC-1 women with Hb. <10 g/dl	Antenatal care revisit in the hospitals	Normal vaginal deliveries in hospitals
2016	2,626,561	518,292	2,233,173	669,339
2017	3,143,825	636,910	2,619,986	741,782
2018	3,248,543	741,499	2,873,328	729,636
2019	2,932,414	683,000	2,987,679	726,531
2020 - observed	2,191,677	499,244	2,467,351	609,227
2020 - projected	3,243,405	794,603.5	3,307,756.5	756,679.5
Difference to predicted value	-32%	-37%	-25%	-19%

Source: DHIS, 2016–2020.

* UN Women, UNFPA and the advisors to the lead author did not participate in the creation of projections. Lack of access to the microdata prevents them from verifying their accuracy. The responsibility for the accuracy of the projections rests fully with the lead author of the paper.

These findings highlight the importance of strengthening vital registration systems, which could have been used to design emergency responses to the pandemic if the data were comprehensive, timely and of quality. Examples of indicators that could be monitored through CRVS if adequate systems were in place include total number of births, maternal deaths and infant deaths.

Births

Birth registration provides legal identity and opens the door to accessing public services. Despite the importance of formally registering and monitoring births, the digital CRVS system in Punjab does not yet include birth registration from hospital data.

DHIS data, however, indicate that 19 per cent fewer births than expected were recorded in Punjab’s hospitals in 2020. Since the onset of the pandemic, many hospitals have limited their services to COVID-19 patients, and pregnant mothers may be choosing to deliver at home due to fear of contagion or financial constraints. Until 2021, DHIS did not include information on the sex of the newborn. Recently, eight districts of Punjab started recording this information, which will be made available in 2021.

In the context of crisis management, birth registration data is essential for governments to determine the infant care services—including vaccinations and essential pediatric care for newborns—as well as post-natal care services that need to be made available. In addition, in the context of other crises that may trigger displacement, specific medical and childcare services may need to be made available in shelters. Sex-disaggregated information is particularly important for the provision of medical services and to ensure preventive health care reaches both girls and boys. Comprehensive birth registration is also essential to ensure an adequate measurement of infant and child mortality.

Table 6: Birth statistics, 2016 to 2020, with projected value for 2020, DHIS.

Year (Feb-Sept)	Births
2016	772,292
2017	865,016
2018	861,860
2019	878,018
2020 - observed	747,891
2020 - projected	922,802
Difference to predicted value	-19%

Maternal mortality

Data recorded by LHWs and reported to the DHIS indicate that the number of reported maternal deaths was slightly higher than the projected number for 2020, although insufficient information is available to ascertain if this difference is statistically significant (see Table 7). The figure does not fully reflect the scale of maternal mortality in the province as many maternal deaths may go unregistered. For instance, families seeking to minimize COVID-19 risks may have not notified LHW when births occurred outside health facilities. An increased tendency to deliver at home, along with the reduction in antenatal care visits as a result of the pandemic, may have contributed to an increase in maternal deaths.

To minimize pregnancy-related complications, the WHO recommends that pregnant women have eight antenatal care contacts with health-care providers.⁵³ DHIS data, however, appears to indicate that antenatal care visits and re-visits were 32 per cent and 25 per cent lower than projected, respectively. In addition, since teaching and district hospitals were dedicated to serving COVID-19 patients only, and financial resources were re-allocated to dealing with the pandemic, outpatient services were discontinued and only emergency cases were accepted in many hospitals. This may have eventually led to fewer hospital-based deliveries and fewer deliveries by skilled birth attendants and increased the chance of complications, therefore contributing to increases in maternal mortality.

During crises, comprehensive information on maternal deaths is essential to serve the needs of pregnant mothers and newborns. The availability of skilled physicians and adequate emergency obstetric care facilities to meet the needs of the pregnant population can play a key life-saving role. The location of the facilities within a reasonable distance of population clusters is also essential to prevent maternal deaths—for instance, near shelters in contexts of displacement. Timely and comprehensive information on maternal deaths can help deploy the necessary personnel and set up facilities where needed; it can also help inform

emergency responses such as, for instance, dedicating select wings within health facilities to deal with antenatal care, deliveries and post-natal care only.

Infant deaths

At present, infant mortality in Pakistan stands at 50.5 deaths per 1,000 live births among girls and 60.6 among boys.⁵⁴ However, when comparing actual reports from LHWs with projected figures, infant deaths observed are 37 per cent higher than projected for 2020. COVID-19-related disruptions in public transit, economic constraints and limited availability of health services in hospitals (outside COVID-19-related) may be deterring mothers from seeking professional medical care for themselves and their newborns—increasing the likelihood of infant deaths and leaving many unrecorded. The data available only include information on total hospital deaths, with no details regarding the age and sex of the deceased. Thus, whether or not the pandemic had a disproportionate effect on the mortality of baby girls or boys cannot be gauged.

Comprehensive and sex-disaggregated infant mortality data is key to preventing infant deaths during crises. According to the WHO, factors significantly associated with neonatal deaths in Pakistan include immaturity-related (low gestational age) (26 per cent), birth asphyxia or hypoxia (26 per cent) and infection (23 per cent).⁵⁵ This highlights that the medical care received by mothers and infants pre- and post-partum contributes greatly to their chances of survival. During crises, ensuring the availability of quality, affordable and accessible antenatal, post-natal and infant care is of high importance for preventing these deaths—this includes well-trained medical professionals, availability of quality equipment as well as sufficient and affordable medication. As COVID-19 has prompted health-care systems globally to divert resources towards the management of the pandemic, other areas such as maternal and infant health may be shouldering the consequences. Limited data on infant deaths and causes, however, may be hampering adequate responses.

53 WHO 2016b.

54 UNSD 2021.

55 Jehan et al. 2009.

Table 7: Women's health indicators from LHW, 2016 to 2020, including projected 2020 figures*

Year (Feb-Sep)	Pregnant women newly registered by LHW	Delivery by skilled persons reported by LHW	Maternal deaths reported by LHW	Infant deaths reported by LHW	No. of modern family planning method users reported by LHW
2016	1,122,813	804,843	819	13,965	23,868,484
2017	1,126,355	808,519	679	19,423	24,248,205
2018	1,133,618	779,229	765	9,229	23,620,606
2019	1,129,746	793,387	653	8,915	24,105,594
2020 - observed	1,104,400	763,196	734	8,961	23,559,738
2020 - projected	1,135,148.5	780,580	626	6,547	23,981,655
Difference to predicted value	-3%	-2%	17%	37%	-2%

Source: Lady Health Workers.

* UN Women, UNFPA and the advisors to the lead author did not participate in the creation of projections. Lack of access to the microdata prevents them from verifying their accuracy. The responsibility for the accuracy of the projections rests fully with the lead author of the paper.

UTILIZING CRVS TO INFORM GENDER-SENSITIVE CRISIS RESPONSES

Quality data disaggregated by sex, age, geography and other socio-demographic variables—are essential for the design of effective crisis responses as they allow for targeted allocation of human and financial resources to meet population needs. For births, deaths and other vital events, CRVS can provide important insights for crisis management if the data are available in a comprehensive and timely manner—particularly at a time when data collection through face-to-face surveys has become impractical. In New Zealand, for example, online death registration systems facilitated monitoring and design of COVID-19 response strategies.⁵⁶ In places such as the Republic of Korea and Singapore, robust CRVS systems combined with strong public health policy responses—building on previous experience with severe acute respiratory syndrome (SARS) and H1N1 influenza—also enabled successful responses to the COVID-19 pandemic.⁵⁷

Where CRVS record-keeping was discontinued due to financial and human resource constraints associated with COVID-19, an inaccurate vital statistics picture, including on excess mortality and COVID-19-related mortality, may hamper government responses and affect health outcomes.⁵⁸

In addition, gender-specific challenges for the production of CRVS and other administrative data have complicated gender-sensitive responses to the crisis. For instance, lack of comprehensive and accurate sex-disaggregated data on cause of death, and limited

availability of information regarding access to family planning and unwanted pregnancies, among other indicators, may be obscuring the situation regarding COVID-19 and maternal mortality—making it difficult for health-care systems to provide targeted responses. Moreover, in countries where birth and marriage registration are patchy, this poses additional challenges for women and girls. Those whose births were not registered or who lack legal identity may encounter issues accessing emergency health care, including reproductive care. Women whose marriages were not recorded may also face challenges inheriting property when a crisis takes their husband's life. This may further reduce their capacity to cope with future shocks. Where CRVS systems do not collate this information comprehensively, it is difficult for governments to assess emergency health-care needs or to devise economic support and stimulus plans for an inclusive economic recovery.

Crafting responses to the pandemic using registration data in Punjab

Although Pakistan's Punjab province is making progress in enhancing birth and death registration systems, available data showcase that these statistics are still incomplete, and low registration in some areas leaves many out of the picture. For instance, data from Pakistan's Demographic and Health Survey (Table 2) highlight that children living in households in

56 AbouZahr et al. 2020.

57 Abdullah and Kim 2020; Kuguyo et al. 2020; Tynan 2020.

58 AbouZahr et al. 2020.

the lowest wealth quintile are much less likely to have their births registered (9 per cent) than children from the highest wealth quintile (76 per cent).⁵⁹ Similarly, birth registration is lower in rural (34 per cent) than urban (60 per cent) areas. Similar gaps exist for other vital events.

COVID-19-related lockdowns and interruptions in public transit systems, closures of medical services and disruptions of other public services have affected some population groups disproportionately, and this may

have further influenced their likelihood of vital event registration during the pandemic. Plus, if population groups living in remote areas or from lower income brackets were less likely to seek professional health care, it is likely that their births or deaths are further underregistered. For the government of Punjab to be able to assess the scale of the challenges associated with a crisis, ensuring civil registration data are comprehensive and accurate, including accurate attribution of causes of death, is essential.

Table 8: Pre-COVID-19 data on select women’s health-related indicators in Punjab

Indicator	MICS 2017-18	PDHS 2017-18*
Birth registration of children under 5	73%	58%
Infant mortality (per 1,000 live births)	60	73**
Institutional deliveries (in hospitals)	73%	73%***
Maternal mortality ratio (deaths per 100,000 live births)	180	N/A
Delivery by skilled persons	76%	75%**
Infant deaths reported	N/A	58%

Notes:

*Refers to data from Punjab.

** Reference period is five years preceding the survey.

*** Reference period is three years preceding the survey.

Source: BOS Punjab 2018 and USAID undated.⁶⁰

Recent evidence also shows that the uses of CRVS go well beyond managing health-related components of the COVID-19 crisis. Since the onset of the pandemic, civil registration offices, including union council offices and NADRA, have closed across the province. This has halted the issuance of computerized national identification cards (CNIC), which are a basic requirement for women to access certain services, such as the Ehsaas (poverty alleviation) programme and some family planning services. As a result, many women have been unable to access these potentially life-saving services.

Quality registration data could support the government of Punjab in designing, among others, stimulus plans and emergency policies to enhance access to family

planning, antenatal care and skilled deliveries—including by setting up dedicated facilities to keep mothers and newborns safe from COVID-19. A lack of information on causes of death by sex and location may be further obscuring the scale of maternal mortality challenges in different locations. Similarly, limited sex-disaggregated information on infant mortality may be hampering the efficacy of prevention and mitigation measures, as health care, medicines and equipment cannot be targeted to the most affected population groups when this information is not available.

Geographical coverage is also an issue. Punjab’s CoD system is only in place in some hospitals. Deaths taking place outside health facilities, remain largely

59 NIPS and ICF 2019

60 Substantial differences exist between estimates derived from both surveys due to differences in sample sizes and data collection locations. MICS 2017-18 was a provincial survey with a sample size of 53,840 households in 2,692 sample clusters, while PDHS 2017-18 was a national survey, in all regions, with a sample of 16,240 households in 580 clusters.

unregistered, as the families of the deceased must present registration documents to their local union council or cantonment board—a process that may deter many from doing so. With such patchy availability of data, comprehensive responses cannot be put in place to prevent further deaths.

Data on other events, such as antenatal care, skilled birth attendance and adolescent birth rates, are also essential to manage the effects of the crisis. As information on these events is not collected through the civil registration system, there is a need to enhance interoperability of the existing system with others, such as DHIS and the LHW-Management Information System in Punjab. The Ministry of Planning, Development and Special Initiatives was assigned to formulate a legal framework for this purpose at the national level, but the draft has not yet been produced.⁶¹ Punjab has also not yet legally assigned roles and responsibilities to different stakeholders for registration, collection, reporting, analysis and dissemination of data on vital events on a regular basis. Other vital information, such as births, are still not registered through the digital CRVS system (CoD system) and hence there are no comprehensive data readily available for evidence-based decision-making to support mothers and newborns in coping with crises. Addressing these issues could contribute to more effective crisis responses in the future.

Despite the challenges, where available, data have proved useful in informing crisis response in the province, as follows:

- Case data enabled the government to impose smart lockdowns in COVID-19 cluster areas. This was a useful argument against resistance on the part of the general public to a province-wide lockdown, which was opposed on the grounds of economic hardship.
- The government also used case data to identify outbreak locations in cities, including religious congregations, and deploy resources in such areas.
- Data on the background characteristics of infected patients (e.g., prisoners, tourists, etc.) was used for introducing different types of targeted standard operating procedures.
- Mortality data was used to identify high-risk areas and allocate more resources to such locations, while moving these away from other areas.
- Case and mortality data were used for contact-tracing, which was carried out through a COVID-19 dashboard where relevant information (including travel history) was made available.

61 Ministry of Planning, Development and Special Initiatives 2020: 16.

CONCLUSIONS AND RECOMMENDATIONS

CRVS systems can play essential roles in times of crisis. Once robust systems are in place, they are well placed to sustain data collection on vital events during challenging periods, including when there are natural disasters or health or humanitarian crises. The availability of comprehensive and quality data can be essential in informing responses to crises and supporting the provision of public services for all. However, in many countries, women's births, deaths and other vital events are disproportionately under-registered. This may result in their exclusion from accessing public services and assets.

The global COVID-19 pandemic has exposed key data gaps in CRVS and, in many countries, the recording of vital events was further interrupted or delayed due to lockdowns, closure of registration offices and re-allocation of financial resources to emergency operations.

In Pakistan's Punjab province, the COVID-19 crisis has put a spotlight on glaring gender gaps in these data—from a lack of sex-disaggregated statistics on births to a lack of quality data on causes of death and maternal health indicators. Data analysis included in this paper shows evidence of these gaps, and sheds light on the extent to which under-registration may be taking place in the province.

Even when additional information is compiled through other tools in Punjab, links between different registration systems are not in place. This poses challenges for the efficient management of a pandemic. For instance, data on COVID-19 cases allowed the government of Punjab to put in place contact tracing strategies and slow down contagion, but lack of accurate gender-specific information on causes of death and associated factors has hampered a gendered response, leaving issues

around family planning, maternal health and infant mortality unaddressed.

Enhancing Punjab's civil registration system can be transformational in ensuring efficient and comprehensive responses to crises. The following recommendations can help ensure adequate systems are in place to cope with future crises:

- All CRVS stakeholders should work together to ensure that all vital events are registered for all population groups. Even if separate systems are in place to record births, deaths and civil events, interoperability of systems is important to provide decision-makers with the information to tackle crises in a holistic manner. The drafting of national legal framework on CRVS is important to ascertain roles and promote the creation of a central repository.
- CRVS recording must be prioritized in times of crisis. As this information is essential for evidence-based crisis response, financial and human resources must not be reallocated to other areas during emergencies. This is in line with recommendations by the United Nations Legal Identity Agenda.⁶²
- The state needs to enhance the availability of human and financial resources and ease barriers to registration. These include cost, distance and time required for registration; legal barriers, including overlapping jurisdictions and cumbersome processes; institutional barriers such as technical capacity of registrars; and lack of information technology.⁶³
- Governments, civil society and the media must work in partnership to help overturn cultural barriers

62 UN LIA Task Force undated.

63 Mursalin and Asharaf 2020.

to registration. These include, among others, discrimination against women and resistance to recording crime-related causes of death, including femicide, intimate partner violence, unsafe abortions and dowry killings.

- During times of health crises, specialized reproductive health-care facilities must be set up to ensure these essential services can continue uninterrupted without fear of contagion. Similarly, safe systems must be put in place to promote the

continued reporting of violence and crime-related deaths. These measures will contribute to ensuring quality registration of deaths and causes of deaths.

- Advocacy strategies should be put in place to raise awareness about the benefits of registration and how to access registration offices. During times of crisis, advocacy should also stress the importance of uninterrupted registration and continued access to health-care facilities, despite any potential crisis-associated barriers.

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