



Structural and social inequities contribute to pockets of low childhood immunisation in New South Wales, Australia

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ABSTRACT

Introduction: Childhood immunisation is a safe and effective way to protect children and communities from serious diseases. In Australia childhood immunisation is generally well accepted with high coverage rates however pockets of low coverage exist. Authors conducted five previous studies in New South Wales which found socio-economic disadvantage, gender inequity, health service access barriers and under-utilisation of immunisation data, rather than ideological opposition, contributed to children's incomplete vaccination.

Material and Methods: Common findings across those five studies were identified. Additional literature was reviewed using a number of lenses, underpinned by a social determinants of health framework.

Results: The lensed approach allowed further exploration of the impact of financial stress, poor mental health, drug and alcohol problems, domestic violence, assumed gender roles, lack of culturally acceptable health care for Indigenous families, geography and changes to immunisation policies on families and how this may have contributed to pockets of low immunisation coverage. Social and structural inequities were revealed. These often contributed to conflicting priorities that meant children's immunisations fell behind.

Discussion: Strategies to address inequities may include reorientation of existing community based child health services to include flexible options such as drop in clinics, outreach services, home visiting and ensuring Indigenous families have access to culturally safe and acceptable services. Assistance with transport would further improve access to services. Better use of immunisation data can aid in the identification of pockets of low coverage and monitor and evaluate service effectiveness.

Conclusions: Greater awareness of social and structural barriers and their impact on families can inform the design of tailored strategies that address the needs of disadvantaged children and families. Without efforts to overcome the inequities that contribute to low immunisation coverage, the status quo persists, leaving children and communities at risk of vaccine preventable diseases.

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Introduction

Childhood immunisation is a safe and effective way to protect children from serious diseases. Immunisation not only protects individual children but also protects the community by reducing the spread of preventable disease. In Australia childhood immunisation is generally well accepted and coverage rates as of November 2020 are close to the national aspirational target of 95 %; one year olds 94.85 %, two year olds 92.55 % and five year olds

95.09 % [1]. Immunisation is provided primarily through General Practice (Primary Care clinicians) by Practice Nurses in booked appointments, during business hours on weekdays. This model of service delivery works well for most families, as evidenced by the high coverage rates.

Despite the high national rates, pockets of low coverage exist with a minority of areas in New South Wales (NSW) having rates below 80.0 % for two year olds [2]. Australian studies exploring reasons for incomplete vaccination found only a small proportion of parents (estimated to be 3.3 %) were ideologically opposed to vaccination [3]. Barriers related to socio-economic disadvantage contributed to children's incomplete vaccination, including inequitable access to health services, missed opportunities to vaccinate

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children who present for other reasons, providers not vaccinating children with mild illness, complex catch-up requirements for children born overseas and other logistical challenges [3–5]. Despite this growing evidence, incomplete vaccination is often attributed to parents ‘vaccine hesitancy’ [6]. Social determinants of health (i.e. conditions in which people live and work, such as income, housing, physical work environment, social support, stress etc) and structural determinants of vaccination (i.e. policies which shape the conditions in which people live and work), including health service access barriers tend to be discussed as motivational factors [7,8]. As a result, public health interventions designed to improve vaccination rates continue to focus on motivational or educational barriers rather than structural barriers and the resulting inequitable access to services [6]. To identify pockets of low coverage in regions of NSW and better understand the contributing factors we used the World Health Organization’s (WHO) Tailoring Immunization Programmes (TIP) approach [9]. TIP was developed by WHO in 2013 to help ensure tailored strategies were developed to meet the unique needs of families and communities with low coverage. TIP uses both quantitative and qualitative methods to gain a deeper understanding of the often complex and context-specific reasons for lower uptake. The process employs social and behavioural insights, community consultation and a theory-based process to develop tailored, multi-faceted solutions which are most likely to improve coverage. TIP includes monitoring and evaluation of newly implemented strategies, with modifications made as required [9].

Authors conducted five TIP studies in NSW between 2016 and 2020, qualitatively exploring with parents, community organisations and health service providers factors influencing childhood vaccination. Study locations were chosen based on analysis of data from the Australian Immunisation Register (AIR), prioritising areas with high numbers and rates of children who were at least one month overdue for at least one scheduled vaccination. In NSW, the AIR accurately represents coverage with the majority of children’s immunisation data captured [10]. Areas of known disadvantage were given precedence. The communities selected were Maitland [11], Umina [12], Tamworth [13], Kempsey [14] and Lismore [15]. The latter three study locations have a relatively high proportion of Aboriginal people (hereafter Indigenous). Maitland is a small regional city in the Hunter New England Local Health District (HNELHD), set amongst wineries and coal mines. Umina is a picturesque beachside community in the Central Coast Local Health District. Tamworth is a regional city set in rural HNELHD, known for its Country Music Festival. Kempsey is a regional town in the Mid North Coast Local Health District, home to some of Australia’s famous writers, musicians and artists. Lismore is a regional city in the Northern NSW Local Health District, set amongst rich agricultural land and national parks. More detail about each TIP study and the methodology can be found in the individual study publications and in the TIP guidance document [9].

Completion of these five TIP studies provides an opportunity to compare findings and highlight common social and structural barriers experienced by families otherwise supportive of childhood vaccination. Delving more deeply into the underlying causes of childhood under-immunisation, using the Framework of Social Determinants of Health (hereafter SDH Framework) [8] will help move the social and structural determinants to the forefront of current debates on factors influencing childhood vaccination.

Ethics approval was obtained for each study, referenced accordingly throughout the paper. This paper uses quotes which were included in our published studies.

Objectives

The objectives of this paper are to; i) highlight common findings across those communities, ii) apply different lenses and use literature in the analysis of the underlying social and structural barriers both within communities and primary health care services.

Material and methods

ST and KB reviewed five TIP papers [11–15] to extract common themes and concepts (thereafter referred to as common findings). Common findings were illustrated with selected quotes. A number of lenses were selected to further analyse common findings: economic, social, gender, cultural, geographic and policy. These lenses were underpinned by the SDH Framework [8]. The SDH Framework acknowledges health behaviours are influenced by social determinants beyond individual factors (such as motivation), including structural determinants (social and public policies, culture, socioeconomic position and gender) and intermediary social determinants (material circumstances, access to health services and psychosocial factors).

Following the review of our five TIP studies, a range of published and grey literature was reviewed using the lenses which allowed further exploration of the impact of financial stress, poor mental health, drug and alcohol problems, domestic violence, assumed gender roles, cultural factors, geography and immunisation policy changes on families and how this may have contributed to pockets of low immunisation coverage.

Results

i) Objective One- Common findings in Five TIP studies.

Overall, there is widespread support for childhood immunisation. Most parents were knowledgeable about the benefits of vaccination for their children and the community more widely. Many parents were familiar with vaccine preventable diseases and some had personal experience of being infected, or knowing someone in their family/community who had contracted disease (see Fig. 1).

1. There is widespread support for childhood immunisation amongst parents
2. Parents struggle with conflicting priorities resulting from socio-economic hardship
3. Parents experience access barriers to immunisation services
4. Outside of General Practice there are limited opportunities for parents to have their children vaccinated
5. Indigenous families and communities report specific barriers associated with cultural safety
6. Readily available surveillance data can be better used to identify pockets of low coverage and monitor and evaluate service delivery

Fig. 1. Common findings in five TIP studies in New South Wales, Australia 2016–2020.

It is crazy not to [support childhood immunisation]. You risk your own child as well as all the other kids who have not been immunised, such as babies. (Umina parent group)

We do know with Aboriginal families they want their children immunised. That's one thing I definitely know. That is not the issue. (Tamworth, health service provider)

Across our study sites we found that children were most likely to fall behind in their scheduled vaccinations as parents struggled with conflicting priorities, often as a result of socio-economic hardship. These included reported domestic violence, poor mental health, drug and alcohol dependence, poverty and other family and community priorities. Parents wanted to have their children immunised but this was often a lesser priority.

I think there's a high rate of domestic violence and drugs in our area and those families are so stressed. The basics come first: safety, clothing, feeding. Immunisation would get pushed aside. (Maitland, health service provider)

I think that the three big issues that affect many of our families on the Central Coast including the Peninsula are mental illness, drug and alcohol issues, and domestic violence. (Umina, Health Service Provider)

I went into hiding. I was ashamed and homeless. I'm so isolated, I never talk to anyone. (Maitland, parent)

If you're stressing about 'I've got no formula for my baby' that takes precedence over 'My baby's not immunised'. (Umina, community member)

Other common findings related to service delivery models and access barriers. In the five study communities, immunisations are provided largely by Practice Nurses in General Practice, with many doctors relying on nurses to administer immunisations. This meant parents had to be available for booked appointments during business hours. Some practices had extended hours in the evenings or Saturday mornings, however, Practice Nurses were not employed for those times and so immunisation services were generally not available. We also found long waiting times for appointments, 'closed books' (busy practices no longer accepting new patients) and out of pocket expenses contributed to children falling behind

in their scheduled immunisations (vaccines themselves are freely provided by the Commonwealth Government in Australia). In one community, due to long waiting times for a GP appointment, some families were advised to travel to a neighbouring town, 50 kms away.

I found that vaccination in Kempsey... getting an appointment with a GP is dreadful... That first 12 months was horrendous. I'd be waiting six-eight weeks for an appointment. (Kempsey, parent group).

Families are struggling to pay \$30 or more for each visit [to a GP], some of them just can't afford it. (Maitland, health service provider).

Other reported service access barriers including lack of transport. Families without a car in these towns with limited public transportation were at a disadvantage. Inconvenient bus timetables and physical challenges (struggling with prams, managing more than one child, walking long distances in hot, humid weather, sometimes uphill), made attending services difficult. Some families reported not having money for bus fares, petrol or taxis. Certain services were inconveniently located, with little or no parking, extensive waiting times for an appointment and long waits in the clinic.

It's really good when the services do provide transport to immunisation. Being a family without a vehicle that makes it a lot easier. Sometimes some families might miss out if they don't have transport. (Lismore, parent).

So if I've got a young baby and four other children, I've got no one to watch the kids, so I can't get the immunisations because I've got to bring the four kids with me plus the baby. (Lismore, parent).

Outside of General Practice there are limited opportunities for parents to have their children vaccinated. Additional immunisation services included a small number of outreach clinics offered by local governments, state funded Child and Family Health Nurses (CFHNs) or Local Health District (LHD) funded Community Health services. These were usually provided only a few days a month, for a half day or even just a couple of hours. Providing immunisa-

tion was no longer 'core businesses' for many child health services, with some adopting the role of checking a child's immunisation status during clinical visits, providing information and advising parents to make an appointment with their GP. There were no firm guidelines for opportunistic immunisations with some nurses providing this service and others not. General Practice-style appointments at Aboriginal Medical Services (AMSs) were available in Tamworth, Kempsey and Lismore, however, business hours appointments were often required. Home visiting from community based services, if available, were reserved only for those in the direst of circumstances and staff were reluctant to promote that option to parents.

The only way you'll get that cohort you're focusing on is to have opportunistic immunisation. There's no problem with home visits, having vaccines in the car and saying the child is overdue and asking if they'd like me to do it now. No-one ever says no. It's not a barrier if you can get the vaccine to them. (Maitland, health service provider)

I'd say that [drop-in] would be more inviting. . .to actually have that type of initiative because scheduling people in and having a tight framework around that, sometimes doesn't work for our [Indigenous] families. (Lismore, health service provider)

Having individuals who are very, very committed to immunisation makes a huge difference, because they're going to go the extra mile, chasing families, making sure that the system enables staff to be flexible with families and supports them in doing that so that those families are caught up. (Maitland, health service provider)

The clinic was an evening clinic to allow working people to come later. They're going to change that to a morning clinic and make it booked appointments. I find that's another barrier. (Tamworth, health service provider)

Indigenous families and communities reported specific barriers. Many Indigenous respondents conveyed stories about the impact of historical and systemic racism in their communities. They spoke of a lack of cultural safety when accessing mainstream health services, feeling unwelcome, being misunderstood and discriminated against. There are few Aboriginal Health Practitioners and Aboriginal Registered Nurses who are authorised to immunise children, which contributed to the reported lack of cultural safety. Seeing a familiar face, someone who understood the daily challenges Indigenous people faced, was very important by families accessing health services.

So, it's giving that familiar face and some sort of feeling that there's an Indigenous worker here. . .So, it's feeling comfortable in that environment where they're going. (Lismore, health service provider)

Because they're going into a non-Aboriginal setting, they're feeling that people are looking at them and judging them, whether their appearance or whether their kids are being naughty- it's just that stigma, I suppose, that hangs around in our community that Aboriginal people don't immunise our kids because they're drunk or they're using drugs or there's - there's just all this other stuff, the racial sort of stuff. (Lismore, health service provider)

Indigenous families often experience transgenerational trauma and conflict which can mean that planned immunisation appointments are not kept. Family and community obligations including cultural practices for 'sorry business' (paying respect to loved ones who have died) take priority over all preventative healthcare appointments. Immunisation was reported as very important by Indigenous families and although their children sometimes fell behind in timeliness, parents knew they would catch up at a later date.

If there's sorry business or other things happening in the family, that's a priority. . .immunisation will be put off because they know it can be done next week or the week after. It's about family being the priority and community being the priority. (Tamworth, health service provider)

Many Indigenous people in our studies conveyed the importance of family support in 'making immunisation happen'. That could include stated support for immunisation generally or in helping with transport, looking after other children or going along to the appointment as a support person. Without that family support, it was harder to make it happen.

A final similarity across the studies was suboptimal use of AIR data to inform service delivery. Good quality immunisation coverage data is available from the AIR and can be used to identify localised pockets of sustained low coverage. These data were either not well utilised or not shared with those who needed to be informed, including immunisation service providers, managers and policy makers. On being shown the data, most local health service providers indicated that they had not been aware of the low coverage in their community. Data were inadequately used to monitor or evaluate health service effectiveness. Reminders and recalls for families whose children were overdue were not used consistently by all services. Lack of time, other priorities (school immunisation programmes, winter influenza campaigns), large distances across LHDs and limited analytical skills were often cited as factors contributing to underutilisation of AIR data.

We actually have no idea, at present, of who's behind. If they don't re-present, we don't have any capacity to follow them up. I'm sure someone would still be getting those reports at public health or some follow-up must be done on someone's level. To me, that's a big issue. (Tamworth, health service provider)

There's not a [immunisation] stakeholder meeting in the Maitland area. That's a strategy they use in a lot of other areas but it's not something we've adopted here just because of resources, I think'. (Maitland, health service provider)

Conducting five TIP studies provided valuable insights into common barriers to childhood immunisation across regions. While each community's experiences are unique and will require a local, tailored strategy, these shared insights can inform public health policy and service delivery as part of a multi-faceted approach to addressing pockets of low coverage both locally and more broadly. Reflecting on the combined studies together, allowed researchers to thoughtfully consider common barriers, many of which were found to be social and structural in nature.

ii) Objective Two-apply different lenses and use literature in the analysis of the underlying social and structural barriers both within communities and primary health care services.

Economic lens

Economic disadvantage placed stress on families that often meant immunisation was a lesser priority. Oxfam recently reported 1.4 million Australians live on as little as \$51 per day [16]. In Australia, children are more likely to live in poverty (18 %) when compared with the rest of the population (14 %), especially those in sole parent families (44 %) or where the main earner is female (23 %) [17]. After accounting for housing costs, those families who rented homes were more likely to be living below the poverty line, compared to home owners [18]. There has been a decline in social housing investment, leaving many families at risk of homelessness or insecure tenure [19]. Almost one fifth of all children in Australia live in families that experience housing stress. Housing stress affects parent's mental health and can result in

material deprivation with fewer resources to invest in children's health [20].

Families are living through a protracted period of unemployment, underemployment, casualisation of the workplace, with cuts to penalty rates, stagnant wage growth and a persistent gender pay gap [21]. Australia's insecure work environment has become normalised under successive government policies that deregulate employment protections and leave workers vulnerable [22]. A prolonged freeze on Australia's unemployment support payments has contributed to a progressive deepening of poverty with children and sole parent families significantly impacted [23]. This low level of financial support is reflected in OECD (Organisation for Economic Co-operation and Development) data that places Australia at the bottom of the list of wealthy countries providing unemployment benefits [24]. Meanwhile, the cost of living continues to rise for utilities (electricity and gas) and for essentials such as food. Out of pocket costs associated with accessing General Practice often means low income families will defer a visit, especially for preventative care [25]. This may be particularly acute for the working poor who do not qualify for government health concessions and must pay those costs. These large economic forces can have a significant impact on families, with financial hardship causing persistent stress and worry about their ability to provide for their children's most basic needs. Using this economic lens, it is understandable how some children can fall behind in their scheduled immunisations.

Social lens

Across the five TIP studies, many parents and service providers spoke of the burden of poor mental health, domestic violence and substance misuse as reasons children may fall behind in immunisation. As parents struggle with these issues, immunisation may easily be placed on the back burner. Domestic violence, poor mental health and substance misuse can threaten family cohesion and break social networks that are so important for children's wellbeing in the early years. These problems are complex and multidimensional and undermine effective parenting and routines that include use of primary health care services [20,26]. Domestic violence is more likely to occur in couples with children [26] and includes physical, emotional and sexual abuse, and coercive control. There is a causal link between exposure to this type of violence and depression, anxiety, alcohol abuse [26], and with homelessness and housing instability [26]. In Australia (2017) 17 % of women experienced physical or sexual violence, most often in their home, from someone they knew [27]. In the same year, 16 % of parents reported poor mental health. This figure rose to 36 % for single parents and 23 % for both Indigenous parents and those in low socio-economic sectors [20]. Mental health problems that affect parenting include anxiety and depression, bipolar disorder, schizophrenia and post-traumatic stress. Substance misuse generally refers to alcohol, opiates, amphetamines, psychoactive drugs and overuse of prescription drugs [26]. Apart from the obvious impact of the physical effects of drugs and alcohol, reducing parental responsiveness to their children, there are often financial problems and criminal behaviour associated with procuring illicit drugs [26]. Depending on the nature and extent of the problem and the availability of social supports, these risk factors, individually or in combination, can result in mothers or carers becoming withdrawn or indifferent to managing household finances and children's health needs [26].

Gender lens

In the TIP studies only a very small number of fathers were available for interview during the day or at playgroups and virtu-

ally all child health service providers were female. So entrenched is this gender based caring responsibility that most people simply accept it, almost without seeing it. Women's role in child rearing and caring is deeply ingrained in patriarchal societies such as Australia. It would be highly unusual to see young, single fathers struggling in the hot afternoon sun to get the pram on the bus, with another child in tow, heading to the child and family immunisation clinic or local play group where they could catch up with other fathers for support. This is clearly the mother's domain.

Women are burdened with other gender imbalances that perpetuate disadvantage and disempowerment. They are more likely than men to live below the poverty line. This is particularly true for sole female parents where 37.2 % live below that line, compared to 17.5 % of single male headed families [28]. More women than men (aged 18–64 years) are either not in the workforce or work part time, reflecting their caring role for children, the elderly and other family members. The Workplace Gender Equality Agency reports that Australia's labour market is highly gender segregated with women employed in low paid industries with part time, casual positions and fewer opportunities for advancement. From the age of 28 years, the gender pay gap widens and persists until the end of a woman's working life. After having children, women experience a significant drop in income which is difficult to recover from even as children get older. These facts reflect women's weaker earning potential and ties to their assumed role in caring for children [29].

In the political realm, there is a lack of gender parity with just one third of parliamentarians in NSW and at the Commonwealth level being female [30]. It is important that women's voices are heard when immunisation policies and legislation are crafted. Their lived experiences and gender based challenges need to be understood and reflected in supportive policy and service planning. Former politician Natasha Stott Despoja, now Australia's representative on the committee for Elimination of Discrimination Against Women calls for more women and more diversity in Australian politics. She believes this will make a difference in policies that affect women and children [31]. The Equity Reference Group for Immunization also used a gender lens to link women's role as carers with their lower status and reduced capacity to act on their child's behalf. They outline the physical and time barriers to accessing immunisation services which may be exacerbated by socio-economic status, ethnicity, education and other social determinants and constructs [32]. Social and economic lenses can easily overlap with this gender lens, exposing the unfair position of women in our society alongside the assumed responsibility for children's immunisations. In all five TIP studies, it was the mothers, not the fathers, who were blamed for their children falling behind. Single mothers in particular felt the stigma 'of being a bad mother', saying 'unmarried mothers and Aboriginal people are being judged as shit ass parents' and that they 'don't care about our kid's health'.

Cultural lens

The lived experiences of Indigenous families and health workers have been described in TIP studies [13–15]. Using a cultural lens exposes the legacy of colonisation. A history of dispossession, segregation, forced removal of children and other dehumanising policies continue to shape the lived experience of Australia's First Peoples today. Transgenerational trauma and its effects, together with institutional, interpersonal and societal racism, contribute to entrenched access barriers to health services and poorer health outcomes [33]. Theory exploring personal racism of employees (attitudes, behaviours of individuals), organisational racism (governance, policy, procedures) and the overarching societal conditions which have disadvantaged Indigenous people since colonisation continues to evolve [34]. The cultural lens, combined

with the other lenses applied here, raises awareness of the many obstacles that Indigenous mums may face when setting out to immunise their children.

Geographic lens

All TIP studies were set outside major urban areas. Participants described some difficulties recruiting and retaining a health workforce, with limited access to General Practice as a result. Australia's vast geography poses challenges for health service delivery. Rural and remote classification refers to areas outside major cities and is based on population and the distance needed to travel for services. People residing in these areas experience poorer health outcomes and inequitable access to primary health care, compared to those in major cities [35]. Delivery of basic primary health care services, where immunisation is usually provided, is hindered by distance, low population density, limited infrastructure and the higher cost of delivering health care outside urban areas [35]. Experts in rural and remote primary health care agree that immunisation is a core service that all Australians should have access to regardless of where they live [36,37], however some parents in our study were not able to have their children immunised in their home town and were advised to travel significant distances to secure a General Practice appointment.

Policy lens

Some of the older parents, carers and service providers in the TIP studies described their previous experience in going to the local council, community health or maternal child health centres on certain days, where all the mums met and lined up for immunisation, 'no questions asked', just 'something every-one did'. Slowly council clinics closed, fewer CFHs offered immunisation as core business and most immunisations were provided in General Practice. There has been an apparent shift from these more flexible, community based, public health services to that of individual care provided in the private sector. Exploring this transition through a policy lens reveals historic changes to Australia's national immunisation strategies. Immunisation policy and practice in Australia is summarised by the National Centre for Immunisation Research and Surveillance (2020) [38]. Financial incentives were introduced and modified over time to motivate GPs (General Practitioners) to ensure children attending their practices were fully immunised for their age with records updated in AIR. The Commonwealth launched the Seven Point Plan (1997) which included incentives to parents through the Maternity Allowance and childcare rebates aimed at reminding and encouraging parents to immunise their children. Immunisation days in areas of low coverage were anticipated. The plan acknowledged a range of other providers including health clinics and local councils with every-one contributing in partnership [39]. In the same year the Australian Childhood Immunisation Charter 1998–2000–Protecting our Children was released with attention to access and equity issues for Indigenous children. The charter emphasised that increasing coverage can only be achieved through pro-active efforts and partnerships between a range of providers [38]. In 2016 new Commonwealth legislation called No Jab No Pay was introduced which required all children to be fully immunised or on a catch up schedule in order to receive a range of childcare benefits, rebates and tax supplements [38]. The punitive No Jab No Pay strategy has not undergone rigorous evaluation nor does it address the many factors known to contribute to incomplete vaccination including access barriers [40].

Reflecting on these policy changes over time encourages a broader understanding of parent's experiences with immunisation

services that have shifted from the more inclusive community based services provided free of charge, to individual care in the private sector, often associated with out of pocket costs.

Discussion

Australia has very high childhood immunisation coverage rates and should be proud of this achievement. Generally, service providers and government health ministers are passionate and proactive in their efforts to reach the aspirational target of 95 % coverage. Australia has good quality surveillance data that can be used to identify areas of low coverage and to monitor and evaluate service delivery. The country has strong national and state immunisation targets, policies and strategies that focus on addressing inequity and disadvantage [41,42]. As a wealthy country with a reliable vaccine supply chain and a passionate and committed workforce who want to immunise children, it is disappointing that pockets of low coverage persist.

TIP provides a valuable guide to explore social and structural factors influencing childhood immunisation. Our use of lenses to analyse structural barriers allows a deeper investigation into each factor. As illustrated with TIP studies and in the literature, structural barriers are often interlinked, with a cumulative impact on families. While these 'big picture problems' may seem outside the influence of individuals and local health services, there are things that can be done. Greater awareness of these underlying issues and how they create barriers for families is a first step. Designing tailored strategies that support disadvantaged families how and when they need it, through family centred primary health care can make all the difference in ensuring a child is fully immunised. re-orienting existing public health, community based services as a way of improving equity of both access and outcome has been shown to be effective in Maitland. Our pilot project in Maitland developed new ways of reaching families living in disadvantaged areas including personalised reminders from public health staff, assistance to connect to bulk billing GPs (no additional out of pocket financial contribution), outreach clinics and home visiting from CFHs for those most in need. Data has shown a 24 % increase in coverage rates between 2016 and 2020 [43]. Further benefits ensue as better access to child health services can lead to early detection of a range of problems, with prompt and appropriate referrals.

In all TIP studies, common reasons for under immunisation are not ideological opposition but rather access barriers, 'conflicting priorities' and issues of cultural safety. More flexible options offered through public health services are needed for some families requiring additional support; those experiencing poor mental health, domestic violence, drug and alcohol addiction, poverty and insecure housing, single mothers and those with more than one child, those lacking transport and without family support. These options may include outreach, home visiting, drop in or after hours' services that are free of charge, in convenient locations with easy access to public transport and free parking. Some families may only need this level of service for a short time, until they are able to get back on their feet with the support from nurses and additional community services.

Child and Family Health Nurses already have the flexibility of providing home visits to those most in need. Existing maternal child health policies advocate for more intensive services including home visiting for the most vulnerable children [44,45]. Assessment tools exist to identify those vulnerable families in the ante-natal period or as close to birth as possible, so that additional supports can be offered [45]. There is potential for policy makers and service planners to build immunisation into these services.

Public health data is available through AIR to identify and monitor areas of low coverage but were not utilised and shared consistently with stakeholders. There is scope to improve use of analytical software in some public health units and implement training in how to use data to inform policy and practice. While in-kind resources may be required as part of service re-orientation, there is an opportunity to evaluate which services are of high value and which are less effective in improving patient outcomes [46]. Changing service delivery takes time, as a recent process evaluation of our Maitland project found. Patience, perseverance and a commitment to equity is required [47].

Although to change deeply entrenched bias and discrimination, global workforce trends and 'economic headwinds' is challenging, a deeper recognition of these factors can prompt a reorientation of public health services to ensure more equitable access to those families who are struggling with 'conflicting priorities' and access barriers. The organisation and funding of health is a political construct. While we strive to maintain neutrality it is an inherent role of government to remove structural barriers to health services or at the very least to provide a clear pathway, for those most disadvantaged, to access childhood immunisation services.

Five communities were selected for these TIP studies but there are more pockets of low coverage in NSW and in other parts of Australia. Without first identifying and understanding these social and structural barriers to immunisation services, and re-orienting existing services accordingly, these gaps will persist.

Limitations

This paper shares the limitations of our qualitative TIP studies. AIR data may not have been updated, meaning some overdue children may have been fully immunised. We explored the views of stakeholders in selected communities and these may not represent views in other locations. While findings may not be generalisable we found that many communities experience these hardships and structural barriers. We do not claim that the barriers we discussed have directly caused children to become overdue but rather that they contribute to those 'conflicting priorities' that mean immunisation may not be the main concern for families. Our studies took place prior to the COVID-19 pandemic and so participants' experiences during that time are not included. We do know that women and those in low socio-economic groups were particularly hard hit economically by COVID-19 restrictions. Women lost more jobs than men, took on more unpaid work (in caring roles and supervising children learning at home) and were less likely to get government support [48]. Housing and employment become even more insecure, and mental health concerns and domestic violence increased. As such, COVID-19 further entrenched women's disadvantage. Health services remain concerned about the impact of COVID-19 on families and their ability to access important primary health services including immunisation.

Conclusions

Pockets of low childhood immunisation coverage persist in diverse communities in NSW, due largely to complex and often inter-twined barriers of socio-economic hardship, gender inequity, lack of cultural safety in health services for Indigenous families and other service access barriers. Using the TIP approach, with the application of a variety of lenses informed by The SDH Framework, provides a valuable guide to explore social and structural factors influencing childhood immunisation. The resulting insights are invaluable in assisting public health policy makers and service providers in tailoring strategies and services that meet the needs of

those most disadvantaged. Co-design of those strategies through collaborative efforts with all relevant groups will be imperative in ensuring their effectiveness. Without a commitment to addressing inequities, the status quo persists, leaving children and communities at risk of vaccine preventable diseases.

Declarations

Ethical Approval and Consent to participate

Not applicable. This paper builds on the findings from five previously published TIP studies, all of which received relevant ethical approvals.

Consent for publication

All authors consented to findings being published.

Availability of data and materials

The data that support the findings of this study are available from the University of Newcastle but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of the University of Newcastle.

Potential competing interests

Dr Thomas' and Dr Bolsewicz's positions are funded by NSW Health.

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Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Dr Thomas', Dr Bolsewicz's, Prof Durrheim's and Dr Ennis' positions are funded by NSW Health. Ms Clark and Dr Bolsewicz's positions are funded by the National Centre for Immunisation Research. Prof Leask's institution receives funding from the World Health Organization.

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