



Allegheny County Department of Human Services

Case study

Name of initiative

Hello Baby

Implementing organization

Allegheny County Department of
Human Services (ACDHS)

Initiative type

Artificial intelligence (AI) system

About the initiative

Hello Baby's prevention initiative provides high quality, targeted social interventions to families with newborns. It features a differentiated approach, with flexible service delivery based on families' individual needs. In addition to self- and community-referral pathways, Hello Baby uses a predictive risk model that utilizes integrated data to identify eligibility for services.

Alignment with UNICEF Policy Guidance on AI for Children

The initiative has aimed to:

- Ensure children's safety
- Prioritize fairness and non-discrimination for children
- Protect children's data and privacy
- Provide transparency, explainability and accountability for children and families

Location

United States

Year launched

2020

Overview

ACDHS's response was Hello Baby, an initiative supported by artificial intelligence (AI) that built on years of cross-disciplinary research, involving child welfare and clinical experts, judges and community leaders, ethicists and data scientists.

In the United States, the Allegheny County Department of Human Services (ACDHS) identified a need to design an early-childhood maltreatment prevention initiative, which could more efficiently address families' complex needs, improve children's outcomes, and maximize child and family well-being, safety and security. ACDHS's response was Hello Baby, an initiative supported by artificial intelligence (AI) that built on years of cross-disciplinary research, involving child welfare and clinical experts, judges and community leaders, ethicists and data scientists.

In a context where there is no one-size-fits-all model of prevention, Hello Baby's innovative strategy combines high quality targeted interventions within a universal system of support that begins with an assessment of the needs of all newborns and their families. To increase the accuracy of targeting, the strategy relies on AI for a predictive risk model (PRM). In the initial identification phase, algorithms analyze datasets already accessible to ACDHS to proactively gauge needs, including identifying at-risk newborns and families that could be facing adverse outcomes and/or have complex needs. The distinctive goal of such an approach is not only to better direct and tailor prevention and support services to at-need families, but to prevent maltreatment from occurring in the first place. Children under the age of 3 represent a high-risk group given their physical vulnerabilities and early-development needs. Providing support services at these crucial ages can significantly and positively impact a child's life.





Context and project origins

Approximately 13,000 children are born in Allegheny County, Pennsylvania each year. Among those, about [235](#) children will be removed from their families and enter foster care before the age of 3. Children under the age of 1 are at the highest risk of any age group of being removed from their families and entering the foster care system. Infancy, in short, is a critical window where children are at the highest risk of being subject to harm or unsafe conditions leading to removal from home, injury or death.

ACDHS has long sought to provide resources to vulnerable children and families to improve early childhood development and prevent adverse outcomes. Three methods have often been used by health and human services agencies to identify and recognize families in need of support. The first is professional judgment, such as a referral from a doctor or a social worker. This referral system is difficult to scale and can be prone to errors. The second is threshold criteria, which often use a single, easily verifiable criterion (such as poverty) to identify at-risk families. The third system is based around [structured assessment tools](#), where families of newborns disclose risk factors, sometimes by filling out lengthy questionnaires to facilitate matches with services.



All three of these approaches have significant drawbacks. They are cumbersome and inadequate at truly recognizing which children are vulnerable. From 2009 to 2016, in half of all cases of abuse or neglect leading to serious injury or death of a child, child welfare was unaware of the family's needs – no referral had been previously made in Allegheny County, so no services had been rendered.

ACDHS decided to try to turn the tide by developing a proactive way to provide assistance to at-risk families – one that offers resources, help, and tries to reduce discrimination, reliance upon outdated indicators, or the need for referrals. The Hello Baby initiative draws on an array of methods for recruitment of families as well as programs to serve them. In addition to the use of an algorithmic model based on universal data held in existing administrative systems to identify the needs of families, community partners can also make referrals for families that they feel would benefit from additional support. The PRM automatically stratifies families into appropriate tiers, which are associated with health and social support programmes that can offer families the assistance they need. Importantly, families are given the ability to opt out of stratification by mailing in a written declaration. They can also opt out of receiving services after they have been allocated to a particular tier.

About the AI system

Hello Baby is supported by an algorithmic model that draws upon an extensive set of 59 indicators sourced from universal data held in existing administrative systems, with the aim to more effectively identify families with high and complex needs.

The PRM indicators are sourced from existing administrative databases falling under the authority of Allegheny County covering:

- > Vital Birth Records
- > Children, Youth and Families
- > County Jail
- > Courts
- > Homeless and Housing Support Services
- > Assisted Housing, and
- > Juvenile Probation.

Allegheny County's integrated data system provides a range of information, such as 'low-birth weight', 'father present on birth certificate', or 'count of days in an emergency shelter'. Taken together, these indicators obtained from a variety of datasets can provide a robust predictive assessment to help determine a family's level of need. This way, the PRM can sort children into a three-tier system (Universal, Family Support and Priority) that will help tailor the level of social and health care support offered to families via Hello Baby.

The goal is that whenever a child is born in Allegheny County, the mother is presented with a Hello Baby welcome kit at the hospital, which gives an overview of the initiative, along with opt-out information. New mothers have 14 days to opt-out of the Hello Baby initiative. If an opt-out request is not received, then ACDHS will use the PRM tool to estimate the risk level of the family, calculating a score that is used to determine which level of services a child and family are eligible for.

More than 70 per cent of families are placed into the Universal tier, which means support is offered in the form of a 2-1-1¹ 24/7 helpline, along with text monitoring provided by [Nurture PA](#), a non-profit organization. More than 24 per cent of families fall into the second tier (Family Support) and are offered additional assistance in the form of family centre support and home visiting programmes. Lastly, 5 per cent of families are placed in the third tier (Priority), where they are offered extensive support through dedicated teams, referrals tailored to needs and service coordination.

1 A 2-1-1 helpline is a national system that provides referral contact information on community support services and/or health and social services.

FIGURE 1: HELLO BABY SERVICE PATHWAYS

ON-BOARDING

- Mother gives birth to child(ren) in Allegheny County
- Hospital presents Hello Baby welcome gift and opt-out information to parent(s) at hospital
- ACDHS receives the birth records for families living in Allegheny County
- ACDHS mails opt-out information to families
- 14 day opt-out window begins

IF NO OPT-OUT RECEIVED

- Calculator runs algorithm and score is assigned
- Eligibility for services determined based on score

IF OPT-OUT RECEIVED

- ⊗ ACDHS marks opt-out status

With the consent of the family, hospital staff and other community partners may also send a Hello Baby referral directly to a Family Center through Allegheny LINK.

UNIVERSAL TIER

Partners

2-1-1, Nurture PA

Key components

Hello Baby website

2-1-1 helpline

Nurture PA text mentoring

FAMILY SUPPORT TIER

Partner

Family Centers

Key components

Family Center supports

Home visiting programmes

PRIORITY TIER

Partner

Healthy Start

Key components

Healthy Start Dyad Teams

High-quality referrals and service coordination

Through its multidisciplinary research and design experience, ACDHS leadership understood the importance of utilizing both a technology and people-centred approach and developed a two-part prevention strategy. While the system uses AI to identify families with complex needs, the initiative then relies on social connection and community-level support through home visiting techniques, hiring culturally competent staff, and professional services to manage care for families that have complex needs.

Hello Baby was rolled out as a pilot programme in September of 2020. Currently, the Universal tier is available to all of Allegheny County, while the more advanced tiers are concentrated in certain neighbourhoods that are part of the pilot. In its initial year of deployment, the pilot has the capacity to enrol 120 families in the Priority tier. Once the pilot concludes, all three tiers (and all associated services) will be available for all children born in Allegheny County.

Application of child-centred requirements



The ACDHS team decided to focus on safety, fairness and non-discrimination, data and privacy, and transparency, explainability and accountability for children, as detailed in the [UNICEF Policy Guidance on AI for Children](#). These child-centred requirements were chosen as they reflect ACDHS's desire to identify and protect the largest number of at-risk children, while ensuring that no prejudiced or discriminatory identifiers were used in the process. Additionally, privacy protection is a high priority, as the multimodal datasets used to classify children contains sensitive information.

Ensure safety for children

Since its inception, Hello Baby's design has been focused on creating a prevention initiative to ensure children's safety, development and well-being. In this context, AI's predictive value is critical to the comprehensive risk assessment process, which aims to proactively prioritize families with significant and complex needs. But this predictive risk assessment is limited to the initial step in Hello Baby's prevention initiative.

Prevention efforts aimed at reducing child welfare involvement have historically targeted families living in high poverty areas. This is based on the incorrect assumption that poverty is the singular driver for abuse. Rather, the root causes of maltreatment are multifactorial and may include untreated (or under-treated) mental health conditions, substance use disorder and intimate partner violence, all of which cut across economic lines and can place children at risk. The predictive analytics model for Hello Baby was built to stratify families based on the likelihood that there may be future significant adversities, as well as safety and security issues.

This model was developed to allow for proactive intervention and has several advantages over traditional approaches to prioritizing social support and protection services for families. This includes the ability to screen large populations efficiently, proactively inform families about their eligibility and counter the tendency to fill service slots with families that are easily engaged (and not necessarily those with the highest needs).

While designing the PRM tool, ACDHS took great care to omit factors that could be discriminatory, such as the need for subsidized health care services, or race. Communities raised concerns that including race would allow biases to interfere with Hello Baby's distribution of services – something the team explicitly wished to avoid. Therefore, the design team took steps to ensure that the eligibility criteria were fair and that the system would not fail to serve children from a specific racial subgroup with Priority services. This includes testing the model against standard fairness metrics, validating the tool's predictive accuracy using a range of objective measures of harm, and excluding predictors that are only observed for a sub-section of the population, such as Medicaid-funded services.

Protect children's data and privacy

The ACDHS team provided several safeguards to protect children's data and privacy in the use, storage and access to the Hello Baby model score. For instance, families are offered the option to opt out of having their data used to determine service eligibility. The information generated by the algorithm, run if a family does not opt out, will not be kept on file either electronically or in hard copy. When appropriate, referrals will be made to Family Centers or Healthy Start, an organization in Allegheny County dedicated to improving maternal and child health and to reducing poor birth outcomes and infant mortality. The providers will only know that ACDHS recommends the family for their services. Since there are many pathways by which families access these services, there will be nothing to indicate that they were identified through the PRM. A family can choose to drop out of the initiative and/or discontinue services at any time, even if they initially chose to participate.



Provide transparency, explainability and accountability for children

ACDHS understands that the Hello Baby initiative could prove confusing or perhaps uncomfortable for parents who were identified as having needs that elevated their eligibility for more intensive services without proper communication put in place. To mitigate this risk, the ACDHS team extensively communicated with community leaders, families, social workers, and other members of the community in order to develop a set of services to promote transparency and aim to maximize child and family well-being, safety and security. Furthermore, ACDHS published the [methodology](#) for the PRM in full so that any interested parties could see exactly how the initiative works.

ACDHS has conducted extensive research on how to engage and retain families with intensive and complex needs. For instance, the ACDHS team conducted case reviews with social workers and child development experts to understand the population they were seeking to reach.

In addition to applied research, they commissioned and published two independent [ethical reviews](#), addressing each of their recommendations, from issues of transparency and passive consent to auditability. The developers also met with families receiving services, service providers, clinical experts, judges, peer support agencies, national experts, local funders and social justice organizations to identify service gaps and concerns on a sustained basis. Collectively, these activities contribute to Hello Baby's accountability and transparency.

ACDHS has conducted extensive research on how to engage and retain families with intensive and complex needs.

Beyond this, Hello Baby has also created a script for staff that responds to common questions that parents may have when they are identified as being in one of the top two tiers. These responses explain, in the most accessible and understandable way possible, how the parents were selected, what datasets the service teams have access to, and how parents can access their own data.

Results, findings and impact

The PRM was tested on anonymized records of 13,155 children born in Allegheny County between 2012 and 2015, and on an initial set of 459 indicators to see which had the strongest correlation with a child being placed in foster care before the age of 3. From this set of indicators, it became readily apparent that neither race nor socioeconomic status were accurate, significant predictors of abuse or removal, and both were discarded. Instead, indicators such as parents' previous incarceration status, prior child welfare referrals, or days that the mother was in a homeless shelter (among many other indicators) were found to be highly useful contributors to identifying families with complex needs.

TABLE 1: TRUE POSITIVE RATE (TPR) AND POSITIVE PREDICTIVE VALUE (PPV) (CALCULATED ON TEST DATA ONLY)

	HELLO BABY PRIORITY	HELLO BABY FAMILY SUPPORT	HELLO BABY UNIVERSAL
Share of the population	5.0%	24.3%	70.1%
Share of all children removed who are eligible (TPR)	54.1%	42.6%	3.3%
Prevalence of removals amongst those eligible (PPV)	20.0%	3.2%	0.0%

Note: The total sample size in test set is 13,155, with Priority group consisting of 662 births; Family Support group of 3,204 births; and Universal group of 9,289 births.



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The PRM was determined to be highly accurate at predicting a child's placement into the foster care system with 92.4 per cent predictive value accuracy. Seventy per cent of the test population of families were placed into the lowest risk tier, Hello Baby Universal. Of this, 70 per cent, less than 1 in 1,000 babies, had gone on to be placed in foster care (representing just 3.3 per cent of all children placed in foster care from the entire set of anonymized records). From the Hello Baby Family Support tier, which included 24.3 per cent of the test population, 3.2 per cent of the subset went on to be removed. Lastly, for the Hello Baby Priority tier (the highest risk), which included 5 per cent of the test population, 20 per cent of children in this subset went on to be removed. This suggests that those in the Priority tier are at considerably heightened risk of future removals compared to the rest of the population.

Further validation (based around other validating indicators such as child abuse, maternal jail booking, or maternal death) continued to show that the PRM was highly accurate at predicting which tiers families should fall into.



Learning journey and future opportunities

While Hello Baby is still in its pilot phase, a few lessons have been learned so far. One of the most important lessons has been the need for partner agencies (such as hospitals and family centers) and additional medical providers to come together and meet frequently. This allows partners to raise concerns and questions and share insights to create unique solutions as Hello Baby is rolled out across multiple organizations. Currently, ACDHS hosts monthly meetings where partners can convene to discuss and modify the roll-out of the prevention initiative in a flexible and friendly manner. ACDHS understands the need to engage the public with Hello Baby and has therefore committed to a large publicity campaign that includes billboards, bus shelters and social media. This will raise public awareness of Hello Baby and hopefully increase the rate at which families remain opted into the support services offered to them.

One of the most important lessons ACDHS learned was the need for partner agencies (such as hospitals and family support centres) and additional medical providers to come together and meet frequently.

ACDHS is still learning and trialing different methods of engagement and is currently focusing on small gifts for new mothers such as packages of diapers and wipes. This form of outreach seems quite positive, and ACDHS will continue this policy to see how engagement improves. Lastly, Hello Baby is identifying better and more effective ways to facilitate a warm

and successful handover from the hospital to the partner programmes, such as Family Support, Healthy Start Dyad Teams² and family doctors, as supportive and personalized touches lead to more successful familial engagement. These aspects, along with identifying new partners to further proactive engagement, represent the greatest opportunities for growth for Hello Baby.

2 Allegheny County Family Centers are hubs for authentic and supportive connections for all families in the community; Healthy Start, Inc., is an organization devoted to improving maternal and child health and to reducing poor birth outcomes and infant mortality in Allegheny County.

About this case study

This case study is part of [UNICEF's Artificial Intelligence for Children project](#), which aims to better understand how AI-powered technologies can protect, provide for and empower children. Through a partnership with the Government of Finland, the project developed a draft [Policy Guidance on AI for Children](#), which contains practical recommendations and principles for governments and industry to create child-centred AI policies and systems. In order to inform and improve future versions of the guidance and inspire others, organizations were selected to pilot the guidance and share their diverse experiences to illustrate how AI-based initiatives could be designed to be more child-centred. The approaches taken, lessons learned and insights gathered will be one contribution to the global effort towards AI policies and systems that support children's development. View all of the case studies on our [website](#).

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