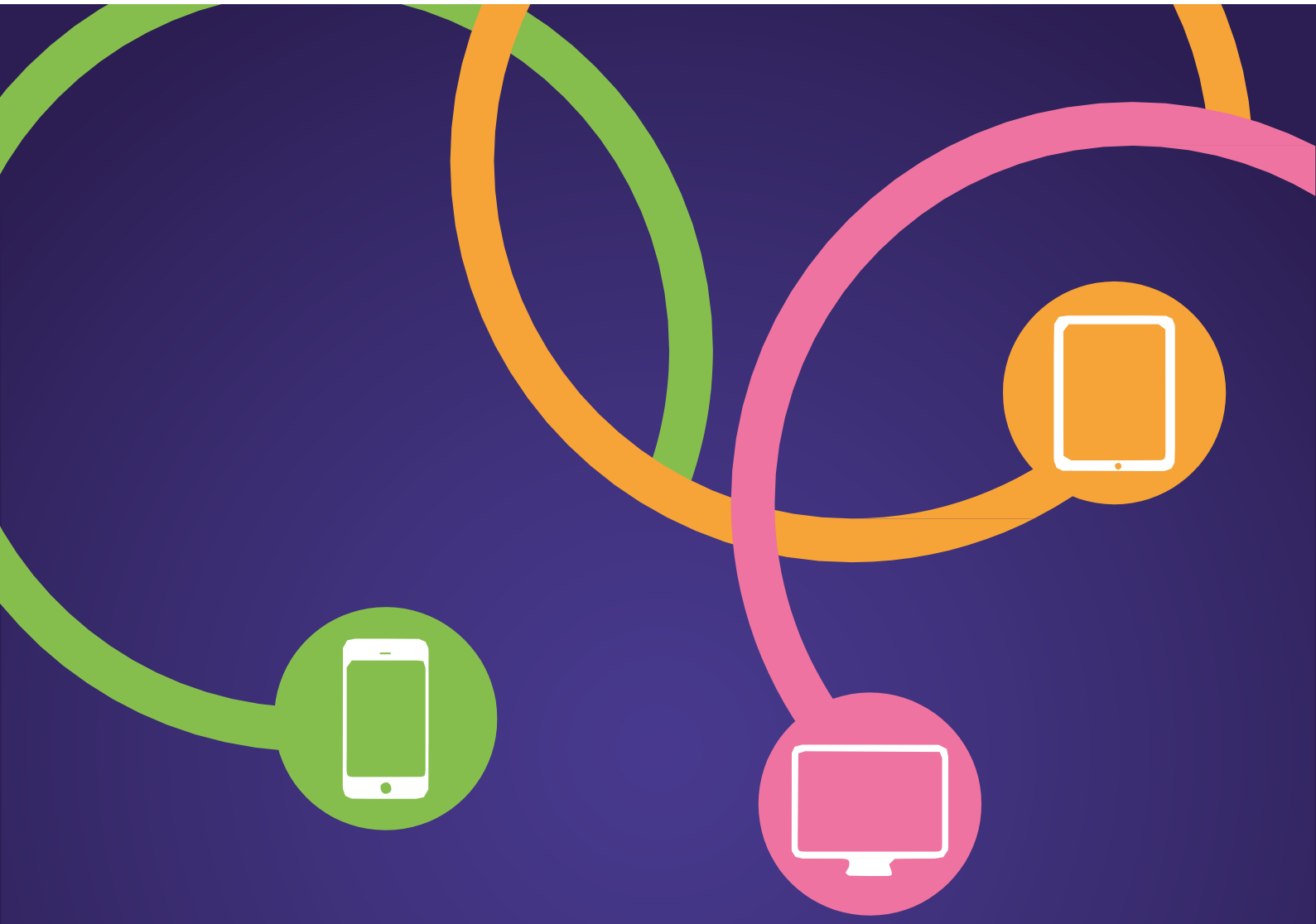
Home & Mobile Health Monitoring

Digital Health & Care Scotland

TEC Technology Enabled Care



# Towards Scaling Up Home and Mobile Health Monitoring *in Tayside*

An evaluation of the outcomes achieved and progress towards scale-up, spread and sustainability **April, 2019**

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***ACKNOWLEDGEMENTS***

*This report would not have been possible without the commitment of those working in HMHM who built evaluation into their challenging workloads and responded to requests to submit it for this evaluation with enthusiasm and grace. Special thanks go to Shona Burge and Sally Wilson.*

# CONTENTS

AT A GLANCE
HMHM IN TAYSIDE Page 1

1 INTRODUCTION AND BACKGROUND Page 3

2 CONTRIBUTIONS TO HMHM OUTCOME ACHIEVEMENT Page 5

3 TOWARDS HMHM SCALE-UP, SPREAD & SUSTAINABILITY Page 11

4 DISCUSSION Page 13

5 RECOMMENDATIONS AND NEXT STEPS Page 14

6 REFERENCES Page 15

# AT A GLANCE
# HMHM IN TAYSIDE



**448 people used Home and Mobile Health Monitoring (HMHM)**
*(also known as remote digital monitoring or telehealth)*
in Tayside from March 2017 to March 2019



Tayside was **new to the use and adoption** of HMHM within local services

**The people using HMHM were hugely positive about it, reporting positive health care experiences**

"It's really simple … everyone should be doing it"

"It saved lots of time"

"It's like I've got a little eye on my shoulder"

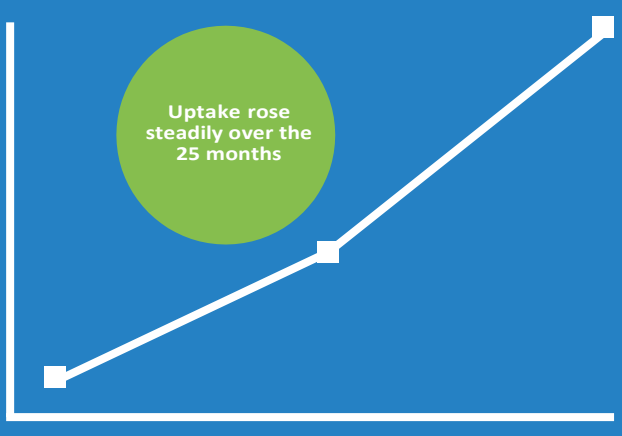
"Amazing support in times of vulnerability"

**There has been significant growth in the adoption and use of HMHM**

In just over two years Tayside moved from zero to having 448 people signed up to use HMHM

Much was expected of HMHM, and Tayside made considerable progress with two years of funding

Uptake rose steadily over time from the first **11** in March 2017 to **448** by March 2019



Tayside's use of HMHM includes **heart failure, weight management, smoke free pregnancy, hypertension, pain management and fatigue management**

There is good evidence of NHS resources being used **more effectively** and **efficiently,** avoiding the need for some appointments and hospital admissions through HMHM

This evaluation presents robust evidence that, when supported by HMHM:

**More people self-manage their health and care**

**Condition-control improves**

**Face to face contacts (appointments) are optimised**

**Access to services increases**

**Tayside's participation in the National HMHM Programme has provided a firm foundation for future developments and much has been learned about accelerating scale up**

We need to remain pragmatic and realistic about how long it might take to move towards scale up and achieve sustainability

This evaluation identified some aspects that would enable future scale up efforts to support implementing HMHM within a complex, dynamic health and care system

Further scale up of HMHM is required to reach population level gain. Tayside would benefit from creating an action plan for HMHM scale-up that could lever the kind of radical change needed

The inherent level of complexity with HMHM, and the results of this evaluation have shown that the benefits at a population level cannot be realised quickly. Success would be increased if some of the complication and complexity were reduced

# 1 INTRODUCTION AND BACKGROUND

## 1.1 TECHNOLOGY ENABLED CARE IN SCOTLAND

### 1.1.1 THE EVOLVING STRATEGIC CONTEXT

Technology Enabled Care (TEC) has increasingly been gaining attention in recent years. When the TEC fund was launched in 2014, the focus was specifically on embedding and expanding the application of technology, because its potential was not widely understood at that time. Home health monitoring was one of the five priority areas identified for investment, with the aim of moving beyond small to medium scale initiatives to create substantial transformational programmes across Scotland. The intention was for TEC to progress from being an adjunct to care to become a core part of health and care delivery. This would require identifying which conditions and citizens could benefit most and which services should be scaled-up beyond the three years of funding available. Sustainability was not expected to be achieved within this timescale, but areas that merited further investment would be identified. Scotland was on a journey to support scale-up and spread, and home health monitoring was a priority.

Progress in the intervening years is captured eloquently in three seminal 2018 publications, which also set a clear strategic vision to ensure that Scottish citizens benefit from TEC's full potential. The first of these was our Parliament's Health and Sport Committee report from its inquiry into *Technology and Innovation in Health and Social Care* (Scottish Parliament, 2018). In their conclusions they noted that the health and social care sector was culturally reluctant to adapt to new ways of working, there were multiple incompatible systems in use, and the uptake of technology was slow. However, the Home and Mobile Health Monitoring workstream was commended as an exemplar that others could learn from.

The second and third core publications were our *Digital Health and Care Strategy* (Scottish Government, 2018a) and *Report of the External Expert Panel* (Scottish Government, 2018b) that created an ambitious vision to improve outcomes, based on the 'world leading' nature of our TEC programme. That vision would be realised by empowering citizens 'to better manage their health and wellbeing, support independent living and gain access to services through digital means' and by scaling the use of technologies, putting in place 'the underpinning architectural and information governance building blocks for the effective flow of information across the whole care system'. There was also a reaffirmation of the Christie Commission (Public Services Commission, 2011) comment that 'radical change in the design and delivery of public services [was] necessary' and that this needed 'to be driven by how best services [could] achieve positive outcomes'. The new strategy noted how critical it was for spread and adoption at scale of proven digital technologies, including the need for scale-up of home and mobile health monitoring (HMHM), the development of digital skills across the workforce, and creation of a national digital platform.

### 1.1.2 WHAT IS HOME AND MOBILE HEALTH MONITORING (HMHM)?

Home and Mobile Health Monitoring (HMHM) was defined in our National Service Model (Scottish Government, 2017) as:

*'Home and mobile health monitoring (remote monitoring) describes those activities that enable patients outside of healthcare settings to acquire, record and relay clinically relevant information about their current condition to an electronic storage system where it can be used to inform or guide self- management decisions by the patient and/or to support diagnosis, treatment and care decisions by professionals'*

HMHM was the agreed descriptor within the TEC programme, but different terms are increasingly being used such as 'Remote Digital Monitoring' or simply 'Remote Monitoring'.

### 1.1.3 TAYSIDE'S PARTICIPATION IN SCOTLAND'S HMHM PROGRAMME

Tayside was one of 12 partners that successfully secured an award from HMHM Programme funding. They joined in Year 2 to implement five Florence protocols (heart failure, weight management, hypertension, smoke-free pregnancy, and oral nutritional supplements) although some of these did not continue with Flo. They began to make progress with enrolment after finding a clinical champion for weight management and watched numbers grow steadily at first and then at an increased rate as colleagues in other services also stepped-up recruitment.

Having strategic support locally and a dedicated TEC Programme Manager were felt to be critical to Tayside's success, as was being able to share evidence of the benefits with key individuals to encourage them to use Florence. However, the inherent simplicity of Florence was found to be a challenge as well as a benefit. This was because it could not be integrated into routine patient care systems. Whilst one very IT literate Cardiologist was able to develop a way of downloading the data from Florence into their cardiology database, a solution that enabled this across all the protocols was not available to other services.

Whilst Tayside had early champions for some protocols, they encountered some challenges in rolling it out to other colleagues. The dispersed teams across different areas were found not to be fully engaged, so they were provided with an opportunity to learn more and benefit from HMHM training. GPs were not fully on board at first, partly because Florence does not link to their IT systems, but there also appeared to be a degree of reluctance to hand over responsibility for blood pressure monitoring to the patients. Some worried that a reading might be missed that could lead to harm if not acted upon. Despite the challenges, Tayside feel strongly that HMHM could be transformational, if it was embedded into existing systems, allowing easy access to the data generated and becoming the new way of doing things.

At a national level, HMHM activity was supported across the programme in a number of ways, including a dedicated central team and a learning collaborative to enable experiences to be shared and problems explored. Newer partners benefited from those who had more experience to share.

## 1.2 EVIDENCE ABOUT HMHM

A review of the available evidence about HMHM implementation and positive outcomes from remote monitoring across a number of conditions can be found in the national evaluation report (Alexander, 2018).

## 1.3 HMHM SCALE-UP, SPREAD AND SUSTAINABILITY

Despite policy directives to focus on scale, Imison et al (2016) caution that focusing on the technology itself does not lead to radical change. Rather 'transformation comes from new ways of working', so we need to look elsewhere to understand scale.

Greenhalgh et al (2017) point out that uptake is often low and explained by a rash of barriers and facilitators. They go on to say that 'it is not individual factors that make or break a technology implementation effort but the dynamic interaction between them. The more complex an innovation or the setting in which it is introduced, the less likely it is to be successfully adopted, scaled up, spread, and sustained'. Using a wealth of available literature and empirical data from technology implementation case studies, they created a framework to evaluate scale, spread and sustainability. Greenhalgh et al (2017) define these terms as:

- Scale-up – moving from a local project to one that is 'business as usual'
- Spread – transfer to new settings
- Sustainability – being maintained long-term, adapting as required

Sustainability was not part of the original aims of HMHM in Scotland, but some of the evaluation learning may be useful. This report comprises two main parts:

- Chapter 2. Evidence of Tayside's contributions to key HMHM outcomes
- Chapter 3. Consideration of HMHM scale-up, spread and sustainability in Tayside

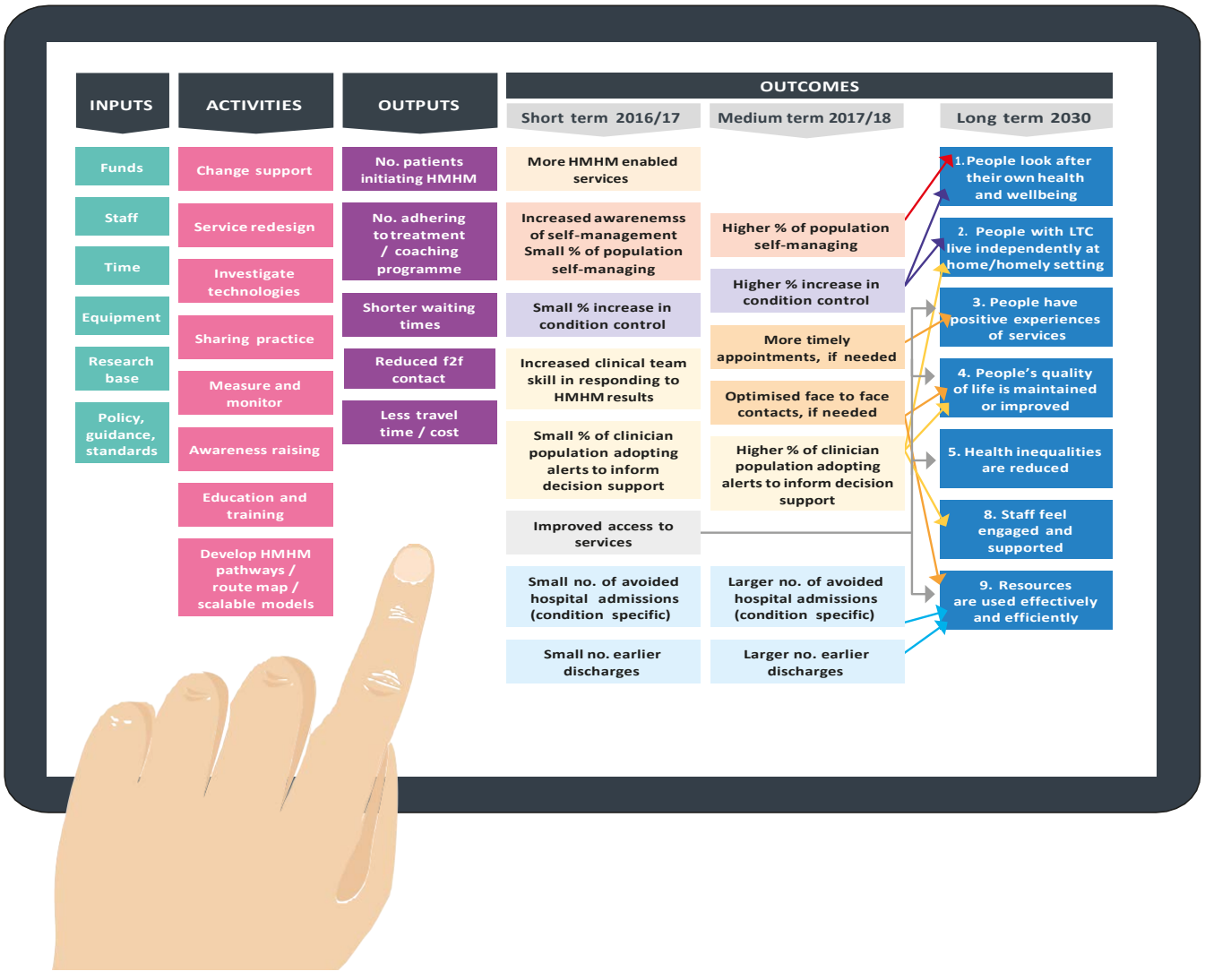
# 2 CONTRIBUTIONS TO HMHM OUTCOME ACHIEVEMENT

## 2.1 OUTCOMES TO BE ACHIEVED BY HMHM IN SCOTLAND

Recognising the policy directive to focus on outcomes, the Home & Mobile Health Monitoring (HMHM) workstream developed its logic model at an early stage. Although the aim was to map out what was to be achieved, the process of creating it was helpful for clarifying what was in or out of scope and communicating this across the partners. The agreed outcomes are shown in Figure 1.

Figure 1 sets out how it was envisaged that the HMHM workstream would link all the inputs and related activities to seven of the national health and wellbeing outcomes (not that the outcomes around carers and safety weren't relevant, just not so obviously influenced by the activities planned). The logic model made explicit the key outcomes to be achieved in the short- and medium-term. They relate mainly to self-management, condition control, the effect on appointments/face to face contacts where these were needed, and access to services. The conversation then progressed to how the HMHM programme would demonstrate outcome achievement.

**Figure 1** – Logic model for national HMHM 2016 to 2018



## 2.2 BRIEF OVERVIEW OF CONTRIBUTION ANALYSIS

In the real world it is rare for a single action to be solely responsible for causing an effect. It is therefore unlikely that Tayside can attribute changes in relation to remote monitoring simply to the new technology (given the different conditions involved and ongoing changes in technology use), so its evaluation requires a method that acknowledges this attribution problem. Contribution Analysis (CA) can encompass this kind of complexity, gathering evidence to support an agreed theory of change (or logic model) that can be refined over time, and generating credible claims that link activities to observed results. There are six steps involved in CA (adapted from Mayne, 2012):

| | | | |
|---|---|---|---|
| **First** | Describe what is being claimed about the link from inputs to observed results | **Fourth** | Assemble an initial contribution story |
| **Second** | Make explicit the theory about how change will be achieved | **Fifth** | Gather additional evidence, including alternative explanations for the results |
| **Third** | Gather evidence around the theory of change | **Sixth** | Revise / strengthen the credible contribution story |

The first four CA steps were covered in the Year 2 HMHM evaluation report (Alexander, 2017):

1. We claimed that the HMHM programme (Tayside was a partner) would enable many more people to realise the range of benefits it offered
2. The logic model in Figure 1 represents the theory of how the HMHM inputs and activities were expected to lead to the short & medium-term outcomes, and contribute to the national health and wellbeing outcomes
3. Evidence was gathered from all 12 HMHM partners in a stepwise process, firstly agreeing which of the logic model outcomes they would contribute to, then what evidence they could gather that would demonstrate this, and finally if they would like any assistance with their evidence. Once received, the quality of the evidence was rated and only that deemed to be a robust demonstration of outcome achievement used in step 4. Robust meant it met generally accepted standards relevant to each type of evidence
4. The robust evidence was assembled into an initial contribution story which showed that the partners had contributed to Scotland having more HMHM enabled services. HMHM had also prompted an increased awareness of self-management and a small increase in condition control, in line with the key outcomes that had been envisaged for Year 2

This evaluation report concentrates on CA steps 5 & 6 i.e. the additional evidence required around the theory of change, including alternative explanations for the results (step 5), and the collation of evidence into a stronger, more credible contribution story (step 6).

## 2.3 EVIDENCE OF OUTCOME ACHIEVEMENT

This evaluation focuses mainly on the outcomes that were to be achieved in the medium-term:

- Higher % of the population self-managing
- Higher % increase in condition control
- Optimised face to face contacts, if needed
- Improved access to services

In addition, there is some evidence around resource use and an overview of patient experience.

### 2.3.1 ABOUT THE EVIDENCE

The Tayside team gathered all of their own evidence for this evaluation and they are to be commended for building this into their work plans. It was agreed that a mix of numbers and words would give a richer overview of progress. Where qualitative data is included it should not be viewed as any less robust than quantitative alternatives; the strengths of both approaches are acknowledged.

### 2.3.2 HMHM OUTCOME – A HIGHER % OF THE POPULATION SELF-MANAGING

**Table 1** – Evidence for 'Higher percentage of the population self-managing, supported by HMHM'
***Outcome definition*** *– People/patients actively doing something, not just submitting readings to Flo/pod*

| Measure | Data source | What the evidence shows |
|---|---|---|
| No. using HMHM to support self-management | Local data | Total using HMHM at 31.3.19 = **448** |
| No. adhering to HMHM recommendations for health improvement | Local data | 46 people were complying with their weight management protocol 12 weeks after starting (at 1.5.18) |
| | | 7 mums-to-be were complying with their stop smoking protocol 3 months after starting (at 1.5.18) |
| Adherence to HMHM cystic fibrosis weight gain protocol | Case study | The protocol for boosting calorie intake provided one person with a system to manage their weight. They said, "I now remember better to eat my snacks." Their resultant weight increase led to the removal of the gastrostomy feeding tube |
| Views on HMHM supporting self-management (from various protocols) | Patient feedback | "Good reminders and prompts"<br>"She [Flo] is like a digital friend that you're willing to share your weight with. As an overweight person I wouldn't tell anyone"<br>"I can look back and see how I'm doing" |
| Views on HMHM supporting self-management for people experiencing breathlessness | Staff feedback | "Patients have really valued Flo's support which has reminded them of the advice given ... and encouraged them to practice techniques designed to alleviate symptoms." |

Table 1 shows that Tayside made good progress in increasing the use of HMHM by the end of March 2019. In just over two years they had not only introduced remote monitoring via Florence text messaging, but scaled it to 448 people in their local population. It had helped people comply with health improvement recommendations related to weight management and stopping smoking and enabled one person who was very keen to have a feeding tube removed to stop needing it. Feedback from HMHM users shows how it helped remind them of what they needed to do or to check their progress over time. Staff were also able to see what difference Flo had made to people experiencing breathlessness. The adoption of HMHM in Tayside has contributed to increased self-management. Figure 2 shows Tayside's HMHM progress.

**Figure 2** – Cumulative total of HMHM users over time

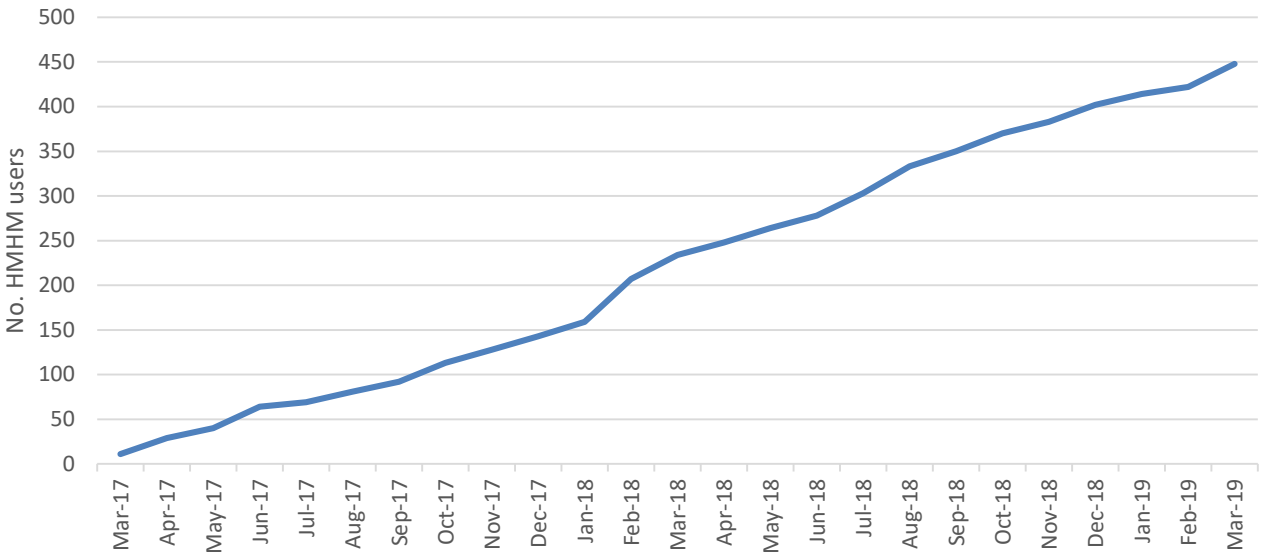



Figure 2 shows the steady rise in number of people who had used HMHM over time, starting from zero before March 2017 and rising to 448 in just 25 months. The rate of increase was slightly slower in the first nine months (to December, 2017), as you might expect with the introduction of a new technology, but the number rose steadily during 2018/19. The level of recruitment was an average of 14 per month during 2017 and rose to 20 per month during 2018 and the start of 2019.

### 2.3.3 HMHM OUTCOME – A HIGHER % INCREASE IN CONDITION CONTROL

**Table 2** – Evidence submitted for 'Higher percentage increase in condition control, supported by HMHM'
***Outcome definition*** *– a 'control' metric, or an action known to improve condition control*

| Measure | Data source | What the evidence shows |
|---|---|---|
| HMHM supporting increased condition control for health improvement | Local data | 7 mums-to-be had maintained their smoking quit three months after starting Flo |
| | | 32 of the 46 people using Flo had lost weight (7 in every 10) compared to 43 of the 67 not using Flo (6.4 in every 10) |
| | Patient video | One person said that Flo is "that friend you'll tell your weight to" and that Flo forced her to look at the scales when she wouldn't have done so otherwise. She liked using Flo to congratulate herself when she saw what she was achieving |



Table 2 illustrates robust evidence of HMHM's contribution towards increased condition control. Some mums-to-be were supported to maintain their non-smoking status and slightly more people managed to lose weight with Flo support compared to those not using Flo. The case study included in Table 2 is a good illustration of how HMHM helped someone who understandably wasn't comfortable sharing their weight to send it to Flo on a weekly basis. In addition to congratulating herself on her achievements, she noted that Flo sent well-worded reminders/tips and not a row if she gained weight.

### 2.3.4 HMHM OUTCOME – 'OPTIMISED FACE TO FACE CONTACTS, SUPPORTED BY HMHM'

**Table 3** – Evidence submitted for 'optimised face to face contacts, supported by HMHM'
***Outcome definition*** *– face to face (f2f) contacts improved by HMHM or contacts avoided i.e. available for others*

| Measure | Data source | What the evidence shows |
|---|---|---|
| HMHM supporting decision-making at pre-assessment clinic | Staff feedback | People who need to have a second blood test before coming in for surgery are arriving better prepared when using Flo. Staff used to remind them of the second test, but this has reduced by 50%. The process of consenting to Flo helps them appreciate that they are responsible for taking action |
| No. appointments avoided by HMHM for contraception injection | Staff feedback | One GP surgery has 68 patients signed up to Flo support to self-administer a contraception injection, instead of attending an appointment for a nurse to do this every three months. This is a saving of 68x4=272 face to face appointments per year |
| Views on contact avoided by HMHM for Heart Failure | Patient feedback | "You know people don't have to come and see you every five minutes" because they're getting "information on a regular basis" from Flo |
| Hospital admissions avoided by HMHM for Heart Failure | Staff feedback | The nurse response to HMHM amber alerts led to 4 unscheduled check-ups for patients who would have been at risk of readmission if their condition had continued to worsen |



Table 3 shows that the use of HMHM has contributed to the optimization of face to face contact with services. Some people were better prepared for their pre-assessment appointments and staff felt that this had an impact on them taking more responsibility for their health. Others avoided the need for appointments when Flo helped them self-administer injections the nurse previously did. Patient feedback shows an understanding that clinicians may not need to contact them, in this case due to weight variation for someone with heart failure. The Heart Failure nurses were also confident that their response to HMHM alerts enabled earlier intervention to avoid further deterioration and potential hospital admission.

### 2.3.5 HMHM OUTCOME – 'IMPROVED ACCESS TO SERVICES, SUPPORTED BY HMHM'

**Table 4** – Evidence submitted for 'improved access to services, supported by HMHM' ***Outcome definition*** *– HMHM prompting increased contact with services, a faster response, or HMHM instead of contact*

| Measure | Data source | What the evidence shows |
|---|---|---|
| HMHM prompting a faster response for heart failure | Local data | The protocol alerts the specialist nurse if the results are not within set parameters. Data shows 4 alerts that led to quicker access to services, avoiding the patient's condition getting worse |
| HMHM prompting additional support for breathlessness | Staff feedback | The Specialist Physiotherapist said, "It is a better patient experience with no extra time from nurses … this is something we have always felt was really needed and wanted to be able to give, we just don't have the capacity." |
| | Patient feedback | Flo is "amazing support in times of vulnerability" |

From the evidence in Table 4, it is clear that use of HMHM improved access to services. The heart failure data shows that four people were able to access services at an earlier stage of their worsening condition and, although the number is small, the interventions may have had a considerable impact on the individuals involved. The physiotherapist working with people experiencing breathlessness noted that Flo provided the additional contact needed when there simply hadn't been enough staff capacity to support them. And the patients themselves really appreciated this, especially when they felt vulnerable.

### 2.3.6 HMHM OUTCOME – 'RESOURCES ARE USED EFFECTIVELY AND EFFICIENTLY'

The results presented in Table 5 show how Tayside contributed to national health and wellbeing outcome number 9 i.e. resources being used effectively and efficiently.

**Table 5** – Evidence for 'resources used effectively and efficiently'

| Measure | Data source | What the evidence shows |
|---|---|---|
| No. self-managing condition, controlling condition | Various | Evidence presented for 'Higher % population self-managing' and 'Higher % increase in condition control' shows examples of responsibility shifting away from healthcare professionals to patients. This not only increases service efficiency, but tends to increase the effectiveness of the interventions |
| No. reduced referrals, clinic appointments, home visits | Various | Evidence presented for 'Optimised face to face contacts' and 'Improved access to services' shows a range of examples of avoided clinic appointments or hospital admissions, having additional information to prompt faster access to hospital care when needed or to support them alleviate symptoms of breathlessness that might otherwise require face to face input |
| Hospital admission costs avoided for Heart Failure | ISD web site | 4 patients avoided hospital admissions by early intervention following alerts<br>Tayside hospital running cost of inpatient case = £3,711<br>Total cost avoided = 4 x £3,711 = £14,844 |
| Practice Nurse costs avoided for contraceptive injections | Local data | Average of 4 Practice Nurse appointments avoided per patient<br>Average length of contraceptive injection appointment = 15 minutes<br>Average cost for 4 x 15 minute appointments = £13.05<br>Total cost avoided for 68 patients = £887.40 per year |
| Clinician time avoided for Pain Management follow up | Local data | Difference in time taken to send Flo text messages and phone patients several times until they answer = 6 hours 30 minutes per 3 month course<br>Total cost of Band 7 clinician time = £480 per year |

Table 5 includes a summary of the evidence presented in Tables 1 to 4 because many of the changes effected by HMHM also produce efficiencies or more effective interventions e.g. when patients/service users know more about why they should comply with advice offered. It also shows a number of costs avoided across three services that have adopted HMHM. One is early intervention to avoid hospital admission and the other two are saving clinical staff time, which although not cash-releasing, contributes to service efficiency and helps to address issues around staff capacity.

### 2.3.7 HMHM OUTCOME – 'PEOPLE HAVE POSITIVE EXPERIENCES OF SERVICES, SUPPORTED BY HMHM'

Tayside gathered evidence directly from their patients/service users that was a clear demonstration of how positively they viewed their use of HMHM (Table 6).

**Table 6** – Evidence submitted for 'people have positive experiences of services, supported by HMHM'

| Measure | Data source | What the evidence shows |
|---|---|---|
| Views on HMHM | Patient interviews, quotes from case studies | Feedback about HMHM from patients/service users is overwhelmingly positive |
| One interviewee referred to a worry at the back of their mind, and said it was good that the information they texted in was available to staff between their appointments. Others mentioned that Flo gave them "reassurance" and one felt that it had helped them maintain their quit smoking attempt when they were struggling. This person had initially not been sure they wanted to be reminded about their previous smoking. One case study subject said, "Flo was a great help", although, "Sometimes the texts could get a bit annoying". Other comments included, "It felt like someone was there", "Very flexible and responsive", "Very easy to use" and "Personal feel to it". | | |

### 2.3.8 ALTERNATIVE EXPLANATIONS FOR THE HMHM OUTCOME RESULTS

In addition to Contribution Analysis enabling the claim that an intervention has made a difference, Mayne (2012) says that rival explanations for the results observed need to be identified and their influence either acknowledged or discounted. This is because the evidence gathered to support a theory of change is considered to be making a contribution to observed results and other factors could have greater impact. Although Mayne suggests that rival explanations should be surfaced along with the theory of change, he also says he is supportive of modifying the six CA steps. This evaluation was felt to be sufficiently complicated to delay exploring rival explanations until step 5 and they are presented in Table 7 in relation to each of the main Year 3 HMHM outcomes. Their exploration supports the claims of contributions to HMHM outcome achievement.

**Table 7** – Exploration of rival explanations for observed HMHM results

| Claim | Rival explanation for results | Rival explanation supported or rejected |
|---|---|---|
| That HMHM enables a higher percentage of the population to self- manage than would have done so without HMHM | The people participating in HMHM have self- selected because they are pre-disposed to self-manage | **Rejected** – local data and case studies are from people who were not previously self-managing, so pre-disposition unlikely |
| | The people participating in HMHM are only complying with an instruction from their clinical team, not actively self-managing | **Rejected** – local data and case studies describe people's increased motivation/ knowledge and better adherence to recommendations |
| | The people participating in HMHM may be motivated to self-manage because of something else happening in their lives unrelated to HMHM | **Rejected** – Flo is enabling success with issues being denied and there are no indications of any additional, unrelated catalysts for change |
| That HMHM enables a higher percentage increase in condition control than would have happened without HMHM | The people participating in HMHM may have experienced a spontaneous improvement in their condition, unrelated to HMHM | **Rejected** – the conditions involved do not tend to improve spontaneously but worsen over time and people report reminders/motivation arising from HMHM |
| | The people participating in HMHM may have had a change to their management regime e.g. medication prescribed, which would explain why their condition improved | **Rejected** – the evidence is of condition management as a result of HMHM, not prior to/at the same time |
| That HMHM has enabled optimised face to face contacts, if needed | The people participating in HMHM have inaccurate perceptions of any change to face to face contacts | **Rejected** – the evidence shows HMHM does result in fewer contacts |
| | Some of the small numbers supporting this claim may not be representative of the impact | **Rejected** – the numbers are reasonably large now |
| | Data on reduced appointments may be the result of improved condition control, not due to HMHM | **Rejected** – the majority of people remotely monitoring have conditions that tend not to spontaneously improve |
| | The hospital admissions avoided may have been due to something other than HMHM | **Possible** – the heart failure patients responding to alerts may have benefited from other supports besides HMHM |
| That HMHM has improved access to services | The people participating in HMHM may have inaccurate perceptions of any changed access to services | **Rejected** – people avoiding appointments could not be mistaken in this |
| | The people participating in HMHM may just have demanded quicker access to services due to something unrelated to HMHM | **Rejected** – people describe HMHM prompting a response to text messages, not something they would normally expect |
| That HMHM results in a positive patient/ service user experience | The people providing feedback may be an unrepresentative sample | **Rejected** – if there had been major problems with HMHM you would expect more negativity to be voiced |

# 3 TOWARDS HMHM SCALE-UP, SPREAD AND SUSTAINABILITY

## 3.1 SCALE-UP, SPREAD AND SUSTAINABILITY OF HMHM

The following definitions (Greenhalgh et al, 2017) are used in the remainder of this report:

- **Scale-up** – moving from a local project to one that is 'business as usual'
- **Spread** – transfer to new settings
- **Sustainability** – maintained long-term, adapting as required

### 3.1.1 SCALE-UP

Our national service model framework (Scottish Government, 2017) defined scale-up as having 1,000-5,000 active patients/service users by 2018/19. By this definition, and allowing for some having relatively small populations, six of the 12 HMHM partnerships funded nationally achieved this by the end of Year 3. Tayside achieved 448 people using HMHM by March 2019, which covers a small percentage of its population. However, Tayside have not thus far targeted highly prevalent conditions for HMHM use, so greater scale-up would not be expected at this stage. Their participation in the national Scale-Up BP programme should address this.

Scale-up success may also be judged in terms of the total number of people who have benefited. There has been a considerable increase in Tayside's numbers in the past two years and it is possible that some people may have remotely monitored without their details being recorded.

The national Scale-Up BP programme is underway and this will drive forward population-level health benefits. It is expected that this will take Scotland as a whole to the remote monitoring tipping point for hypertension.

### 3.1.2 SPREAD

The national service model also projected that by 2018/19, most partners would have spread HMHM across 2 to 8 pathways of care and used 1 to 3 different media channels i.e. text messages, tablets, web sites etc. Tayside has successfully spread to a number of different conditions, but thus far only using Florence.

### 3.1.3 SUSTAINABILITY

Although not an aim of the HMHM Programme at the outset, it is worth considering what we have learned thus far that could inform sustainability. There is a high risk that if suitable resourcing is not allocated to support the continued scale-up and spread of HMHM across Scotland its potential will not be realised. Efforts also need to be made to retain knowledge and HMHM expertise within the workforce developed over the course of the programme and continue to develop digital health and care leadership roles for HMHM.

In addition, more work is needed across the NHS and health and social care partnerships to embed the learning and successes to date across whole pathways of care and to spread to other conditions and new digital technologies as they become available. It is becoming increasingly important for NHS boards and Integrated Joint Boards to capitalise on the benefits of embedded digital health and care/TEC, and specifically remote monitoring, as key enablers of service transformation programmes in Scotland. A hands-off approach at this stage is a major threat to long-term maintenance and the radical new ways of working that HMHM offers.

## 3.2 A FRAMEWORK TO EVALUATE THE SUCCESS OF HMHM

The **N**on-adoption or **A**bandonment of technology by individuals and difficulties achieving **S**cale-up, **S**pread and **S**ustainability (NASSS) framework was developed to help predict and evaluate success or otherwise with health and social care technologies such as HMHM. An early version complexity assessment tool (NASSS-CAT) was made available for testing in Tayside (Table 8).

**Table 8** – Complexity rating of HMHM in Tayside – applying the NASSS-CAT

| NASSS domain | Tayside equivalent | Complexity ratings of different aspects of each NASSS domain |
|---|---|---|
| The condition or illness | Heart Failure, pain & fatigue management contraception, health improvement | **6 simple sub-components:** some of the conditions are well-understood, follow a predictable course and have predictable implications for care, others do not<br>**4 complicated sub-components:** there is some uncertainty with pain management<br>**4 complex sub-components:** some aspects of fatigue management are less certain |
| The innovation (technology) | Florence text messaging | **13 simple sub-components:** the HMHM technology is straightforward, well-understood and will have a predictable effect<br>**2 complicated sub-component:** there are some privacy/security concerns<br>**2 complex sub-components:** data reporting/output from Florence is not accurate or reliable, a key technology needs to be installed across multiple technical systems to achieve integration |
| The value proposition | Increased clinical and cost-effectiveness, improved health, | **14 simple sub-components:** the technology generates value for different groups of people<br>**3 complicated sub-component:** the value proposition is likely to change in future<br>**1 complex sub-component:** the technology has not yet been shown to be cost-effective for pain or fatigue management |
| The intended adopters | Clinical staff, patients, administrative staff and the Telehealth team | **5 simple sub-components:** there are no major issues for patients, carers or others indirectly involved<br>**4 complicated sub-components:** there is some uncertainty about front-line staff adopting the technology<br>**2 complex sub-components:** there will be changes to individual users' perceptions of the technology in future |
| The organisation(s) | NHS Tayside, 3 x Health & Social Care Partnerships (Angus, Perth & Kinross, Dundee City) | **5 simple sub-components:** the organization is reasonably ready for innovation and there is some capacity to adopt it<br>**7 complicated sub-components:** some aspects of technology implementation are not in place, there are no slack resources and co-ordination is challenging<br>**4 complex sub-components:** further work is needed to routinize the technology and future funding is not secure |
| The external context | National strategy, good evidence-base, digital age | ***Further review of this domain is needed, across the sub-components***<br>**6 simple sub-components:** the policy context, opportunities to share learning and future environment are all conducive to HMHM<br>**1 complicated sub-component:** some work has been done on the regulatory context<br>**0 complex sub-components** |
| Project implementation | Project supported at all levels, dedicated team to implement HMHM | **25 simple sub-components:** technically fairly straightforward, there are few structural or operational issues, and the socio-political context is largely conducive<br>**6 complicated sub-components:** some broadband and integration issues, reporting is challenging, and more work is needed to bring others on board<br>**4 complex sub-components:** there are funding constraints, greater co-operation across sectors is needed, and external changes may affect the organisation's ability to spread the technology |

Table 8 shows that the many of sub-components of each NASSS domain were relatively 'simple', with elements of complication and complexity. Greenhalgh et al (2018) say that programmes with mainly complicated domains were 'difficult, slow and expensive' but not impossible to implement, whilst those with considerable complexity were rarely ever mainstreamed. The main domains requiring attention in Tayside are related to the organisations involved, although more detailed exploration of aspects rated as complex or complicated in Table 8 is warranted. Scale-up, spread and sustainability will only be achieved if conditions are in place which reduce the level of complexity for as many of the NASSS domains as possible (Greenhalgh et al, 2018).

# 4 DISCUSSION

## 4.1 DOING THINGS DIFFERENTLY WITH EVALUATION METHODOLOGY

The policy context for HMHM in Scotland is ambitious and there is a strong underlying assumption that technology has the ability to effect major system change. However, a focus on the technology itself is unlikely to lead to the kind of radical change suggested in recent policy documents (Imison et al, 2016).

Evaluation methodologies are needed that can absorb the complexity associated with system-wide change and this chimes with current evaluation practice where theory-based approaches are becoming the norm. The Contribution Analysis approach adopted in the first part of this evaluation set out the theory of how HMHM was to effect change in a logic model (Figure 1). This theory of change was then used to assemble evidence of how Tayside had contributed to achievement of the desired outcomes. Contribution Analysis does not relinquish rigour, since only evidence that is deemed to be sufficiently robust is included, but the descriptor 'good enough' covers the fact that it was not possible (nor arguably desirable) to control all the conditions under which data was gathered. Tayside collected a range of data via methods appropriate to local circumstances. They should be applauded for building evaluation into their HMHM programme and for the evidence they generated.

## 4.2 THE IMPACT OF HMHM ON OUTCOMES

The achievements made by Tayside are considerable, starting from zero and reaching 448 users in two years. The evidence published in this report (Tables 1 to 4) shows robust evidence from Tayside of the contribution of HMHM towards achieving:

- a higher percentage of the population self-managing
- increased condition control
- optimised face to face contacts
- improved access to services.

There was also good evidence submitted of contributions to resources being used more effectively and efficiently and positive patient/service user experience.

Contribution Analysis has proved to be a useful method for collating evaluation results. Not only do we have evidence of contributions to outcome achievement, but there is considerable detail on the experience of patients/service users who were overwhelmingly positive about HMHM. It could be argued that these are early adopters of new approaches and therefore more likely than others to be positive, but this can be countered by evidence in interviews where the people involved did not describe themselves as technophiles.

Contribution Analysis also requires a consideration of risks to the theory of change (Mayne, 2012) i.e. that the results observed may be due to something unrelated to the programme being evaluated. For this reason alternative explanations for the outcome results were considered (Table 8) and this provided a degree of confidence that HMHM has indeed made a contribution to their achievement.

## 4.3 PROGRESS WITH SCALE-UP, SPREAD AND SUSTAINABILITY

Tayside has had a unique journey from start to present day with much learning to share. Two important factors are worth highlighting. Firstly, they have displayed considerable enthusiasm and commitment in implementing HMHM, something that has been at times challenging. Secondly the collaboration between them and the National HMHM Team has worked well in sharing learning and related resources. Whilst acknowledging how much success has been achieved, the level of scale, spread and sustainability needs to be considered. The numbers in Tayside have risen steadily and they have spread to a number of different conditions.

At a population level, more HMHM activity is required. Without continued policy and implementation focus there is unlikely to be sufficient scale-up or spread to realise the benefits that remain possible.

Although not one of the original HMHM programme aims, in order to sustain the progress made to date and build on what has been learned thus far, there is a need to retain and continue to exploit the expertise developed in Tayside. Within the context of ongoing national support, there is a need to build HMHM (and other aspects of TEC) into service plans. These ongoing investments need to plan for the inherent challenges, and acknowledge how long it can take to realise the full benefits, so that HMHM can become 'business as usual' in time.

It is timely that Greenhalgh et al (2017, 2018) identified the need to go beyond the myriad lists of facilitators and barriers to successful implementation of new technologies. With a sound theoretical basis, these authors have developed a useful framework for determining a programme's complexity and have tested it in the field. Although they say it needs to be applied more, testing it in Tayside has suggested that the implementation of HMHM has raised challenges, with some aspects rated as complicated or complex; these need to be addressed.

# 5 RECOMMENDATIONS AND NEXT STEPS

In recent years, HMHM in Tayside has scaled-up and spread from zero to 448 people. As previously discussed, this level of progress should be applauded, but it is also contended that they have not yet been implementing HMHM long enough for it to be considered sufficiently scaled-up or spread to realise the level of benefit that our policy documents would like to achieve. **It is recommended that Tayside continue to scale-up and spread remote monitoring** in order to realise its full potential.

**More time is needed** to reach a tipping point where HMHM becomes business as usual. A wealth of expertise has been created in Tayside and ongoing efforts are needed to ensure that this continues to be available for others wishing to adopt HMHM. The number of people whose outcomes have improved is not yet large enough to impact on Tayside's health profile.

Scale-up, spread and sustainability are affected by the level of complexity associated with HMHM. Testing the Non- adoption or Abandonment of technology by individuals and difficulties achieving Scale-up, Spread and Sustainability (NASSS) framework for HMHM (Table 8) showed that **Tayside had a few aspects of complication and complexity, and they should give consideration to how to simplify them.** Developing an action plan around these results should enable identification of local solutions to some aspects and links to national work for others.

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