

**Breast Screening**  
**Health Equity Audit**

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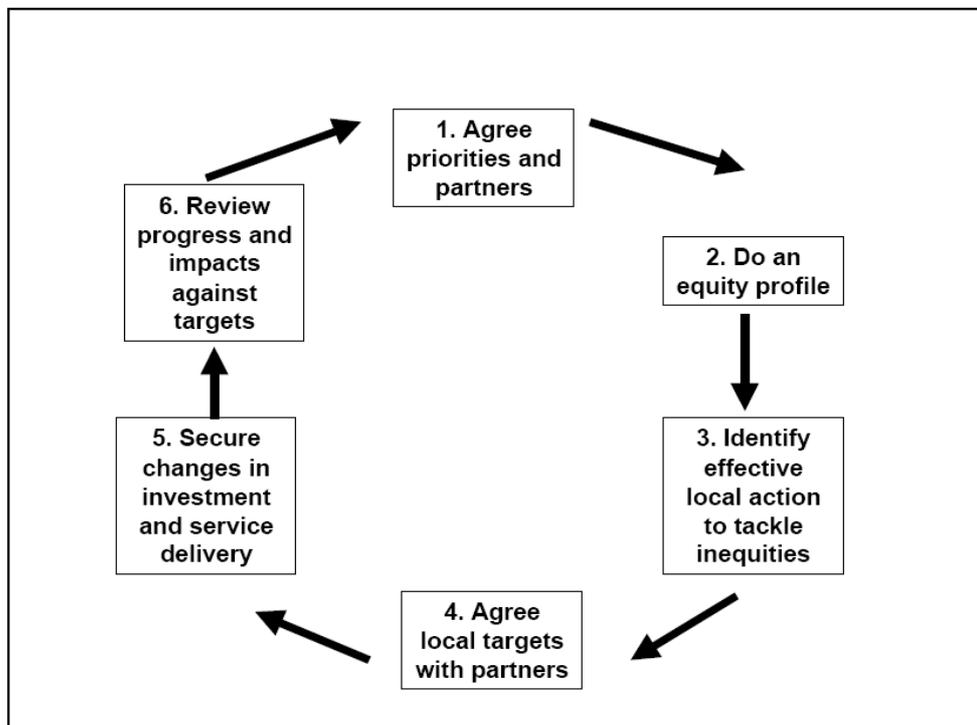
# 1. What is health equity audit?

Health equity audit is a process by which partners systematically review inequities in the causes of ill health, and access to effective services and their outcomes, for a defined population and ensure that further action is agreed and incorporated into policy, plans and practice. Finally, actions taken are reviewed to assess whether inequities have been reduced (Jacobson, 2002).

## 1.1 What's the process of doing an equity audit?

There are six main stages in a health equity audit, which are illustrated below (Figure 1).

**Figure 1: The cycle of health equity audit**



This report mainly covers the second and third steps in the equity audit process, 2. Do an equity profile and 3. Identify effective local action to tackle inequities.

## **2 Introduction**

### **2.1 Breast Cancer Screening**

Breast cancer is the most common cancer in England. In 2006 there were 38,004 new cases of breast cancer in England alone. This is a slight reduction to the previous year (1.20%) with 38,464 cases diagnosed in 2005. Breast cancer accounts for over a third (31%) of all cases of cancer. The number of deaths from the disease is falling overall, however for the pooled years 2006-08 Wirral has a SMR of 110 - 10% more deaths than the national average and 4<sup>th</sup> highest in the North West (NCHOD, 2009).

Breast screening is a method of detecting breast cancer at a very early stage. Breast screening coverage is a major performance indicator for PCTs and contributes to the balanced scorecard on which star ratings have been based. Reductions in mortality rates from cancer in people aged under 75 years also feature among PCT targets (balanced scorecard indicator, PSA target, Choosing Health target). The target uptake for breast cancer is 80% and the minimum standard is 70%. During the previous two years (2007/8 & 2008/09) Wirral have exceeded the minimum standard with an uptake score of 78.7% and 78.7% respectively and are 4<sup>th</sup> highest in the North West for breast screening uptake.

This health equity audit allows us to examine rates of coverage of breast screening in different groups which is important since low rates of breast screening coverage in certain groups (inequity of uptake) would lead to health inequalities.

This report aims to explore the relationship between breast screening uptake (%) and distance (km) from a single breast screening unit in Wirral.

## **3 Method**

Using a population-based, cross-sectional study design, all unduplicated women (can be invited more than once in any screening round) who were invited for breast screening in round 6 were eligible for inclusion in the study. The primary outcome for investigation was whether women attended for breast screening. Age, deprivation and distance (from Clatterbridge screening centre to a woman's usual residence) were used to assess the extent that women attended for breast screening in Wirral population.

### **3.1 Data Source**

The screening data included; NHS Number and 'End Code' which stated whether the woman was successfully screened, did not attend, premature closure, excluded, or withdrawn for any reason. This data was then recoded into the outcome of interest 'screened' and 'not screened'. The Wirral historic GP registered population table was matched to ascertain the postcode of women involved in this screening round. The postcode was matched with Ordinance Survey postcode address file to obtain the LSOA etc of each woman.

### **3.2 Distance**

Road distance was calculated in kilometers (km) from each woman's usual residence to the breast screening unit using Accession Software.

### **3.3 Age**

Age of the woman was categorised into 5-year age bands ranging from 45-49 to 70+ and grouped accordingly.

### **3.4 Deprivation**

The Index of Multiple Deprivation (IMD) quintile is based on IMD 2007, each postcode is categorised a score based on the LSOA and a rank is computed where 1 = the least deprived quintile and 5 = the most deprived quintile.

### **3.5 Data Analysis**

Analysis to determine uptake was calculated by census ward and a GIS map was produced to illustrate variation using MapInfo Software.

### **3.6 Logistic Regression**

Logistic regression is used to predict the presence or absence of outcome (screened or not screened) based on a set of predictor variables (age, road distance from screening unit and IMD). This method was applied using SPSS v17 where an Odds Ratio was computed to predict the likelihood of attending breast screening based on the above variables.



## 4.2 Variation in Uptake by Age, Deprivation and Distance

### 4.2.1 Variation by Age

The unadjusted uptake appeared to be lower in the younger age groups compared to those in the older age groups, however the trend was slightly inconsistent across all age group categories with a uptake of 77% within the 45 - 50 age range and 84% in those aged 70 and over. The odds ratio of attendance for women aged 45 – 49 years compared to those aged 70 years and over was 1.39 (95% CI 1.14 – 1.69).

Thus women aged 70 and over are 39% more likely to attend screening, than women aged 45-49 years (Table 1).

**Table 1: Uptake of breast cancer screening by Age, 2004 - 2007**

Age group (years)	Invited	Attended	Unadjusted Uptake(%)	Adjusted odds ratio 95% confidence Intervals
70+	1581	1330	84%	1.39 (1.14 - 1.69)
65 - 69	7831	5805	74%	0.80 (0.68 - 0.93)
60 -64	9003	7058	78%	1.00 (0.86 - 1.17)
55 - 59	10829	8600	79%	1.07 (0.92 - 1.24)
50 - 54	10191	8018	79%	1.04 (0.90 - 1.21)
45 - 49	1111	858	77%	1

## 4.2.2 Variation by Deprivation

The unadjusted uptake of breast cancer screening gradually decreased with increasing socio-economic deprivation. The uptake was 70% in the most deprived quintile compared with 84% in the least deprived quintile. After adjustment for distance and age there was a significant association with deprivation. The odds ratio of attendance for those women in the most deprived quintile compared to those in the least deprived quintile was 0.46 (95% CI 0.42 - 0.50).

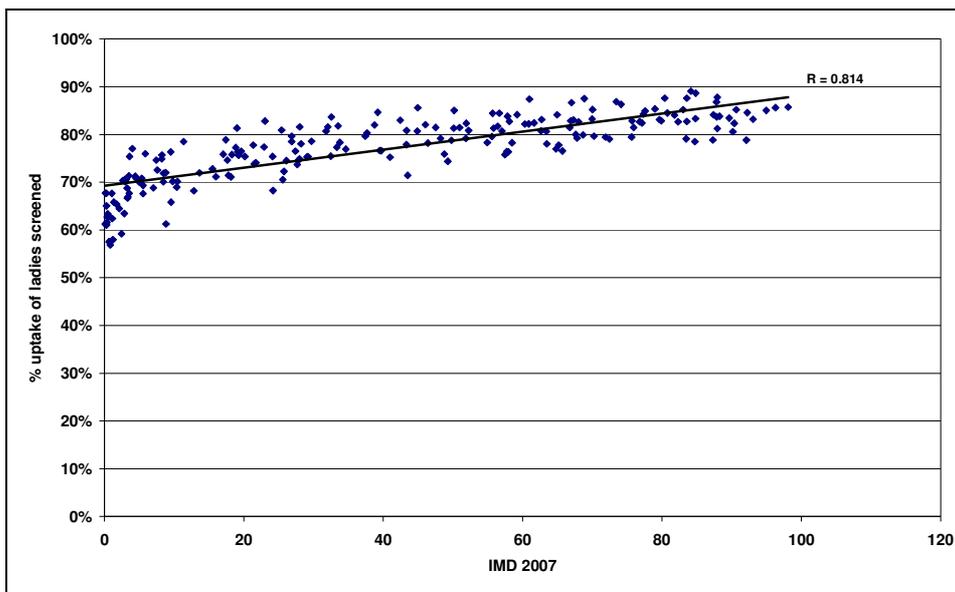
Thus women from the most deprived quintile are 54% least likely to attend breast screening than women from the least deprived quintile (Table 2).

**Table 2: Uptake of breast screening by deprivation, 2004 - 2007**

Socioeconomic deprivation quintile	Invited	Attended	Unadjusted Uptake(%)	Adjusted odds ratio 95% confidence Intervals
5 (most deprived)	12085	8516	70%	0.46 (0.42 - 0.50)
4	6047	4716	78%	0.67 (0.60 - 0.73)
3	11087	8974	81%	0.80 (0.73 - 0.87)
2	5883	4874	83%	0.90 (0.81 - 0.99)
1 (least deprived)	5445	4589	84%	1

Figure 2 shows the strong positive relationship between screening uptake and deprivation ( $r = 0.81$ ).

**Figure 2: Deprivation vs % Uptake by LSOA, 2004 - 2007**



### 4.2.3 Variation by Distance

More than half (56%) of all women invited for screening lived within 9km of the breast screening unit. Unadjusted uptake appeared to be lower with increasing distance from the breast screening unit however the trend was slightly inconsistent across distance categories. The uptake was 78% among women living greater than 12km compared with 84% in women living less than 3km to the breast screening unit. After adjustment for deprivation and age screening uptake decreases with increasing distance (Table 3). The odds ratio of attendance for women living less than 3km away compared to those women who live more than 12km was 0.78 (95% CI 0.69 - 0.88).

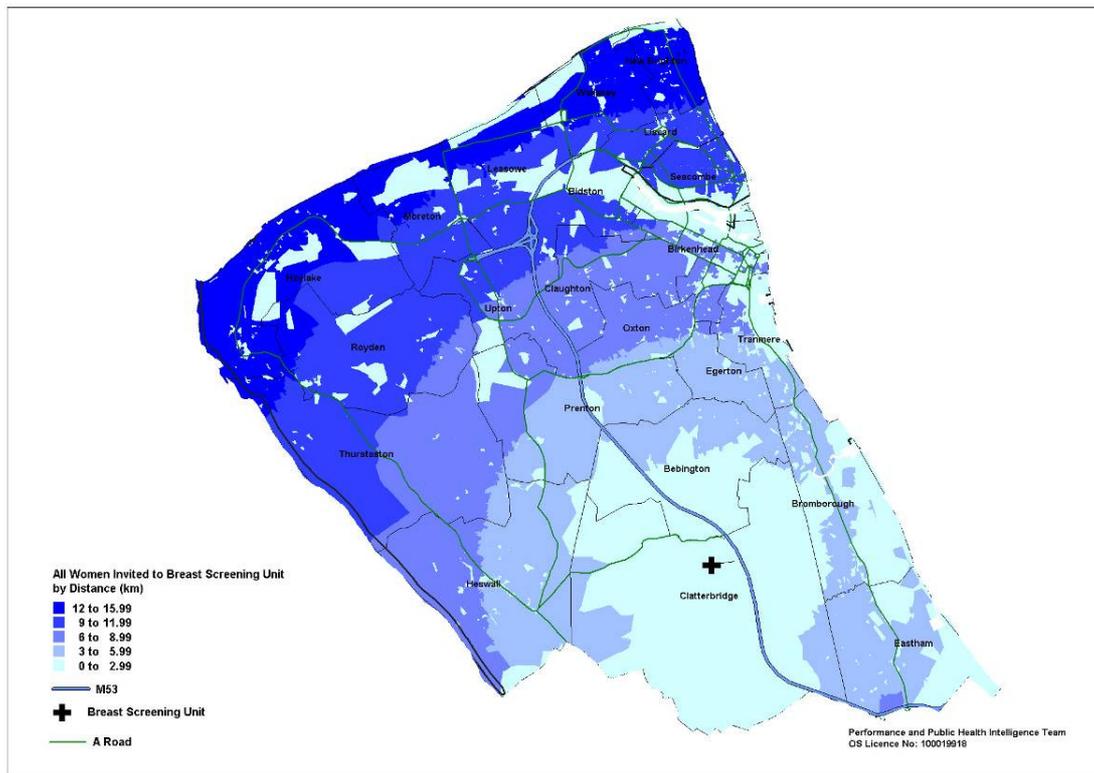
Thus women who live more than 12km away are 22% least likely to attend breast screening.

**Table 3: Uptake of breast screening by Distance 2004 – 2007**

Distance by category (km)	Invited	Attended	Unadjusted Uptake(%)	Adjusted odds ratio 95% confidence Intervals
≥ 12	8220	6378	78%	0.78 (0.69 - 0.88)
≥ 9 ≤ 11.99	9714	7371	76%	0.79 (0.70 - 0.89)
≥ 6 ≤ 8.99	9337	7147	77%	0.81 (0.71 - 0.91)
≥ 3 ≤ 5.99	10721	8639	81%	0.93 (0.83 - 1.05)
≥ 0 ≤ 2.99	2519	2115	84%	1

The map below illustrates road distance from the screening unit to each woman's usual residence who had been invited for a breast screen in Round 6. Where the map is shaded light blue this reflects those women who live the shortest distance from the breast screening unit (less than 3km), where the map is shaded dark blue this reflects those women who live the farthest distance from the breast screening unit (more than 12km).

**Map 2: Thematic map of road distance (km) from breast screening unit of all women invited 2004 - 2007**



**N.B. sporadic areas on the map shaded light blue or white are areas where there is no postcode information available to calculate distance (Map 2).**

## 5 Conclusion

The results of this equity audit show that deprivation was most significantly associated with uptake of breast cancer screening (Maheswaran et al., 2006: Maxwell, 2000). Breast screening uptake in the more deprived population was significantly less than in the more affluent populations after adjustment for distance from the screening unit and age.

However, independent of deprivation, distance from the screening unit also had a significant affect upon breast screening uptake (***for detailed evidence review see Appendix 1***). It is estimated that reducing distance travelled to the breast screening unit could increase uptake by 1-1.5% (approximately 400 screens). These results suggest that providing a breast screening service closer to where women live could potentially increase breast screening uptake.

Further work is necessary to explore the relationship between those women invited for screening or referred via GP and health outcome over a period of time.

## 6 Recommendations

In order to improve breast screening uptake in discrete populations, support and interventions should be aimed at women living in the most deprived areas of Wirral, as well as women from ethnic minority backgrounds. However, in order for this to be achieved improved methods of ethnicity recording will have to be implemented.

Listed below are specific recommendations for improved uptake:

### GP Practice level

- GP patient data audit
  - Patients who have not attended screening in the respective round should be flagged on the system. When the patient next visits GP, this will be discussed and appointment made to attend screening unit.
  - Ethnicity to be recorded on GP systems.
  - Correct postcode at the time of screening.
- GP Practices to pro-actively contact women who have not attended screening.
- Keep up-to-date the patients last known address so invitations can be sent out.
- GP performance monitoring for breast screening uptake.

### Education

- Education on the benefits of breast screening.
  - Breast screening road-shows/health awareness day with key personnel involved i.e. breast cancer nurse, screening unit staff.
  - Interactive guide of what is involved in a routine breast screen i.e. DVD or illustrative pictures (may help to remove the myth about the breast screening process).
  - Leaflets made available at GP surgeries, local community centres, large workplaces (produced in several formats i.e. large print, different languages).

### Distance & Setting

- Pilot the use of a mobile screening van to target poor areas of uptake (this could be achieved by:
  - Social marketing campaigns using mosaic (can direct mobile van to discrete geographic areas of low uptake).
  - Free shuttle bus to and from Clatterbridge to a specific location i.e. local town centres within Wirral.

- More convenient location with better transport links.
- Flexible appointment system – appointments are often automatically booked for patient.
- Breast screening to be offered at;
  - Non-health settings such as large workplaces i.e. Unilever, Local medium size businesses and factories
  - Poly-clinics (various health services in one establishment)

### **Data Cleanliness**

- Ensure correct coding is used when recording non-attendees and screening complete

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## **Appendix 1: Evidence Review: Location of Breast Cancer Screening Units**

### **Introduction**

There is some evidence that the location of breast screening units can affect uptake. A study conducted by Reynolds et al (1997) located a mammography machine at a workplace with a large population of women aged over 40. In the first twenty-two months of operation, a large proportion (92%) of invited women attended, and almost all (97%) were satisfied with the screening process and said they would attend again for further screening. A further study aimed at making screening more accessible by offering same-day breast and/or cervical screening appointments to women who presented at an inner-city medical walk-in centre. Results showed throughput to the service was high and attendance at follow-up appointments compared favourably with uptake rates in other settings (Doyle et al., 1996). Evidence shows that relocating breast screening units in non-traditional settings such as walk-in centres or emergency departments can significantly impact on uptake especially in hard to reach groups, which ultimately may have a positive effect (Maheswaran, 2006).

A similar study using a church as a non-traditional setting asked female members of the congregation whether they would use mobile breast units located in churches. Results from the questionnaire showed that over a third (31.7%) said they would definitely use the mobile van at a church site, over a fifth (21.9%) said they would probably use the van and nearly a third (28.7%) said they would probably not use the van. The odds for saying yes to using the van came from a variety of responders including; those from minority ethnic backgrounds, those with no insurance and those who had reported no mammogram in the previous 2 years (Derose, 2002).

### **Distance from Screening Centre**

Relocating breast services can not only have a positive impact on uptake but they can also have negative impact to a certain extent and the benefits must outweigh the risk incurred. Maxwell (2000) found relocating a static breast screening unit reduced attendance by 1.1% at the new site and 2% at the old site. The district that is 'home' to the breast unit had seen a 1% increase in attendance. This is also true for other districts around the area and vice versa. The direct distance between the centre of the women's home postcode district and the screening unit had a significant effect on the attendance rate ( $p = 0.045$ ). For each kilometer further from the screening unit, the attendance decreased by approximately 2%. However, there was a 6.4% difference between the highest and lowest district attendance rates, the highest rates being in the less deprived areas. Therefore, socio-economic factors seem to have greater impact on attendance than geographical location alone.

A recent study in Australia explored the effect of distance, social disadvantage, responses to breast screening invitations, and uptake. They found that women who had not previously been screened and lived in disadvantaged areas had a higher response rate to an invitation to attend screening if they lived relatively close to their nearest clinic. The main results show over a tenth (12%) of women who live within 3 kilometres of their closest clinic attended screening and those who live more than 3 kilometres only 8% attended (Hyndman et al., 2000). This suggests that uptake from more disadvantage groups could be increased if existing clinics were replaced to more closer convenient locations (Linsell et al., 2009).

### **Older Women**

Another proven method of effective screening pertinent to the older population is to place mobile screening units in communal establishments such as urban meal sites or senior centres. Evidence shows as women get older they are less likely to drive than younger women and are more likely to use the above services to socialise and partake in other activities. This study was based on a randomised control trial of 60 community-based meal sites, senior clubs and centres. The intervention was either health education only or health education and on-site mammography service over a 2-year period. The results showed that women who were offered mobile mammography and health education were significantly more likely than those offered health education only to report undergoing mammography within 3 months of the interventions (55% vs 40%,  $p = 0.001$ ). After adjustment the effect was still significant adjusted Odds Ratio, 1.83; (95% CI 1.22–2.74). One other important result was the mobile unit was particularly effective in getting women whose mammographic examination was long overdue by at least 2 years to undergo examination. Therefore, access to on-site mammography was clinically and statistically more effective in achieving mammography screening than patient education methods alone, (Reuben et al., 2002). However this study was US based but could have similar outcomes in the UK, for example studies could be facilitated by agencies such as Age Concern or Help the Aged with day centres, social clubs being possible locations for large proportions of older women at any one time.

### **Social Marketing**

Using social marketing methods as a means to improve breast screening uptake can be effective, in terms of target audience. For example a report published by Cancer Research UK (2008) explored the various initiatives PCTs around the country were undertaking to improve cancer screening uptake in relation to mobile breast screening units, 115 PCTs out of 155 responded many sharing useful examples of good practice. These approaches may not have any statistically significant value but have been proven to be successful in several PCTs locally across the UK. Some initiatives include:

- Press releases sent to local newspapers, business and employers encouraging them to attend when invited for screening.
- Regular advertising on buses and metro stations

To target individual's from black and minority ethnic backgrounds, initiatives include:

- Broadcasts on local ethnic minority radio stations
- Information provided in different translations
- Interpreters are employed on the mobile screening van
- Invitation letters sent out with a key message in all major languages spoken within you PCT area

To target individuals who do not want or unable to attend initiatives include:

- Extended 'working days' on mobile screening units

## Summary of Interventions

Intervention	Results	Conclusion
Locating a mammography machine in a workplace (Reynolds et al 1997)	Out of the women invited 4210 (92%) attended, (90%) of the screening mammograms were interpreted as negative or benign. 18 cancers were detected. Almost all respondents that completed a questionnaire were satisfied with screening process.	Fixed-facility screening units for medium to large workplaces are an effective way of reducing the barriers and encouraging women to attend breast screening.
Same day breast and/or cervical screening appointments within a inner-city medical walk-in centre (Doyle et al 1996; Maheswaran, 2006)	Initial survey results revealed 1,230 (52%) had inadequate screening, of those 55% reported interest in same day screening. Over a 1 year period, 403 women were screened for breast and/or cervical cancer. Of the 48 women with abnormal pap tests, compliance at initial gynaecological clinic follow-up was 56%. Compliance for mammography appointments was 49% and of those with abnormal results 77% attended for follow-up.	These compliance rates compare favourably to those for screening performed in more traditional settings. Therefore, cancer screening programmes in non-traditional settings such as walk-in clinics and emergency departments are an effective way of targeting patients who are at risk of remaining unscreened.
Using places of worship i.e. churches to locate mobile breast screening vans (Derose, 2002)	Results from the questionnaire showed, 31.7% said they would definitely use the van at a church site, 21.9% said they would probably use the van, and 28.7% said they would probably not use the van. The odds of saying yes to using the van came from a variety of responders including; those from minority ethnic backgrounds, those with no insurance, and from those who have reported no mammogram in the previous 2 years	Non-traditional settings can prove and favourably option for mobile breast screening units.
Relocating a breast screening unit (Maxwell, 2000; Linsell et al., 2009)	Results showed relocating a static breast service reduced attendance by 1.1% at the new site and 2% at the old site. The district that is 'home' to the new breast unit seen a 1% increase in attendance. The direct distance between the centre of a woman's home	Socio-economic factors seem to have greater impact on attendance than geographical location alone.

Intervention	Results	Conclusion
	<p>postcode district and the screening unit had a significant effect on attendance rate (<math>p=0.045</math>). For each kilometre further from the screening unit, the attendance decreased by approximately 2%. However, there was a 6.4% difference between highest and lowest attendance rates, the highest rates seen in the less deprived areas.</p>	
<p>The effects of distance, social disadvantage, responses to breast screening invitations and uptake (Hyndman, 2000)</p>	<p>The results found women who had not previously been screened and lived in a disadvantaged area had a higher response rate to attend screening if they lived relatively close to their nearest clinic. Main results showed (12%) of women who live within 3 kilometres only (8%) attended.</p>	<p>This suggests uptake from more disadvantaged groups could be increased if existing clinics were replaced to more convenient locations.</p>
<p>Locating mobile units in communal establishments i.e. urban meal sites, senior centres (Reuben et al., 2002)</p>	<p>Results showed that women who were offered mobile mammography and health education were significantly more likely than those offered health education only to report undergoing mammography within 3 months of the interventions (55% vs 40%, <math>p=0.001</math>). After adjustment the effect was still significant, adjusted OR (1.83 95% CI 1.22 2.74). Other results included an increase in women whose mammogram is long overdue by at least 2 years to undergo breast examination.</p>	<p>Locating mobile units in communal establishments such as senior centres and providing mammography sessions rather than health education alone proves a more effective way of screening at-risk populations in neutral locations.</p>

From the current literature available there is little new evidence to support the benefits of mobile breast screening units. However there is good evidence to suggest that they can improve uptake in areas of most need along with other interventions like health education and or making use of local media such as newspapers, radios etc.

The current location of Wirral Breast Service is in the ward of Clatterbridge and is not well served by public transport. The nearest train station is approximately 1-2 miles walk away. Therefore anyone with mobility issues this is not a convenient option for them to choose. The more practical form of transport is by car, but as screening uptake shows those who are least likely to attend live in the most deprived areas of Wirral and are less likely to drive or own a car.

A mobile breast screening site may be feasible to be placed in those areas of low uptake for that reason drawing from some of the interventions mentioned and forming a new bespoke service. Financial constraints and cost-benefits would need to be identified but in order to bridge the gap and increase the detection rate of breast cancer in the poorest areas this may be a reasonable option.

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